

THE CULTURE OF DATA USE IN THE MANAGEMENT STRUCTURES OF A RURAL
HEALTH DISTRICT IN THE WESTERN CAPE PROVINCE

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DECLARATION

I, THEUNIS HURTER, hereby declare that this is my original work and has not been presented before for the award of a Masters' Degree in Public Health.

THEUNIS HURTER

ELECTRONICALLY SIGNED

30 JUNE 2015

THESIS ABSTRACT

Background

Health information system (HIS) performance has been defined as “data quality and the continuous use of information”. The quality of data, as well as the culture of data use in an organisation has been shown to shape the way data is used. In order to fully understand data use practices with the aim of strengthening the HIS, one needs to first understand whether the context and “culture” in the organisation is conducive to data use. Are the policies, structures, processes and people within the organisation aiding data use? In what ways do managers view and use data?

Aim

In this study, we sought to explore the culture of health information use on a district and sub district management level. The aim was to contribute to the wider knowledge on information use by exploring the data use practices and factors that shape its use among these managers. What is the culture of data use in the district management structures? When, why and in what way does data get brought into the management discussion? Do managers feel that the information produced are useful in aiding their decision making, and what do they recommend be changed? What are the key factors that affect data use practices?

Methods

This thesis comprises a literature review of published articles, conducted in order to provide context for the study of the culture of data use, whilst defining the problem to be investigated. The full thesis comprises the literature review, the original study protocol, a full manuscript in the format of a publishable article and a set of appendices. The study was granted ethical approval and permission from the provincial department of health.

Given the exploratory purpose of the study, we conducted a mini ethnographic case study using qualitative research methods in a rural health district of the Western Cape Province of South Africa. The researcher employed ethnographic methods that included participant observation, in depth key informant interviews, document reviews as well as informal conversations to collect data. We used the PRISM framework as a guide for analysing our findings.

Findings

Our findings suggest that there is a strong focus in this district on reporting requirements and technical aspects of producing good quality data. The drive to achieve excellence in production of quality data may be in tension with another important organisational value, which is the need of managers, for ease of access to relevant data, to facilitate decision-making and improvement of health service delivery. Managers' overall experience is of not receiving the health information support they require. Instead, they experienced an organisational culture of using health information to narrowly measure targets and performance, which left them feeling unsupported and frustrated. Managers were resilient

in managing these challenges and created alternative ways of accessing the data they needed for decision-making.

Conclusion

We conclude that in our setting where the technical component of producing good data was well performed, this was not sufficient to guarantee effective use of data for quality improvements. Behavioural and organisational factors were found to play an important role as both obstacles and facilitators in shaping the culture of data use, information that is useful to inform design of interventions for health information strengthening. .

Key words: Health Information system, Information use, data use culture; information for decision making; quality improvement.

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Theunis Hurter conducted the interviews, participant observation, data collection, analyses and report writing.

Prof Chris Colvin (main supervisor) assisted in the design of the study, reviewed transcripts and analyses and gave guidance with regards to the textual write up.

Dr Natalie Leon (co-supervisor) assisted in the design of the study, reviewed transcripts and analyses and gave guidance with regards to the textual write up.

TABLE OF CONTENTS

Declaration	2
Thesis Abstract	3
<i>Background</i>	<i>3</i>
<i>Aim</i>	<i>3</i>
<i>Methods</i>	<i>4</i>
<i>Findings</i>	<i>4</i>
<i>Conclusion</i>	<i>5</i>
Acknowledgements.....	6
Part A: Study Protocol	10
Background	10
The culture of data use	11
Data use Policies	13
Study setting: HAST Program of the Western Cape Department of Health	14
<i>Electronic ART monitoring system</i>	<i>14</i>
<i>Electronic Tuberculosis (TB) monitoring system</i>	<i>15</i>
<i>Sexually transmitted infections (STI) and Prevention of Mother to Child transmission of HIV (PMTCT) monitoring system.....</i>	<i>16</i>
Purpose of the study.....	16
<i>Research question:.....</i>	<i>16</i>
Methodology.....	17
<i>Setting</i>	<i>17</i>
<i>Population and sampling</i>	<i>18</i>
<i>Data collection</i>	<i>20</i>
<i>Data Analysis.....</i>	<i>23</i>
<i>Dissemination of results.....</i>	<i>24</i>
Ethics.....	24
<i>Participant observations</i>	<i>25</i>
<i>Interviews.....</i>	<i>26</i>
<i>The potential risk of the study</i>	<i>27</i>
<i>The potential benefit of the study.....</i>	<i>28</i>
Budget.....	29
Time Table.....	29
Bibliography	30
Part B: Structured Literature Review	1
Objectives	1
Literature search strategy.....	1
Review of the literature	2
<i>The call for information use for strengthening health systems towards universal health coverage</i>	<i>2</i>
<i>What influences managers' information use for decision making?.....</i>	<i>3</i>
<i>Framework for designing, strengthening and evaluating RHIS</i>	<i>4</i>
<i>The Health Information System in South Africa.....</i>	<i>11</i>
<i>The need for further research</i>	<i>14</i>

Bibliography	15
Part C: Journal ready manuscript	18
Abstract.....	18
<i>Background</i>	18
<i>Aim</i>	18
<i>Methods</i>	18
<i>Findings</i>	19
<i>Conclusion</i>	19
Background.....	20
<i>The Performance of Routine Information Systems Management (PRISM) framework</i>	20
<i>The relationship between producing good quality data and the use of data for decision-making</i>	22
<i>The culture of data use</i>	23
<i>The South African District Health Information System (DHIS)</i>	26
Methods.....	27
<i>Sampling</i>	28
<i>Data collection</i>	28
<i>Participant observation</i>	29
<i>Key informant interviews</i>	30
<i>Document Reviews</i>	30
<i>Data analyses</i>	31
<i>Reflexivity</i>	32
<i>Ethical approval</i>	33
The Context of Data Use in the Rural District	33
<i>Summary of participants</i>	33
<i>The District Health System</i>	35
<i>The District Health Management Structure</i>	35
<i>The Sub-district Health Management Structure</i>	36
<i>District Health Information System</i>	37
<i>Routine data flow policy</i>	38
<i>Meetings as data feedback mechanisms</i>	41
The culture of data use	42
<i>Are management's health information needs fulfilled?</i>	42
<i>Using health information to measure targets: What is missing?</i>	46
<i>Data quality versus data use</i>	51
Discussion.....	57
Limitations	59
Conclusion.....	60
Bibliography	61
Part D: Appendix 1: Questionnaire/data capture instrument(s)	63
Key informant interview questionnaire	63
<i>Example questions for clinical and programme managers:</i>	63
<i>Example questions for information managers:</i>	65
Data collection sheet for participant observations and document reviews.....	67
Participant observation data summary tool	69
Appendix 2: Consent form and participant information form	71
Information sheet and consent form for participant observation of meetings	71
Information sheet and consent form for Interviews	76
Appendix 3: Letter of approval from Research Ethics Committee.....	81

Appendix 4: Instructions for Author of journal whose format has been used	82
Instructions for authors: BMC Health Services Research	82

PART A: STUDY PROTOCOL

BACKGROUND

In 2007 the World Health Organisation (WHO) identified six building blocks (or attributes) of a health system that is essential for health system strengthening with the aim of improving outcomes. These include service delivery, health workforce, health information systems (HIS), medical products, financing, as well as leadership and governance (WHO, 2007).

The WHO defines a well-functioning HIS as “one that ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health systems performance and health status” (WHO, 2007). This definition implies that the information that is produced is of good quality and produced with the aim of using it for action and decision making. Nutley and Reynolds (2013) define data use as “the analysis, synthesis, interpretation, and review of data as part of a decision-making process, regardless of the source of the data (Nutley & Reynolds, 2013). For this process to occur there needs to be a relationship between management and the information produced and regular interaction with the data in order for the data to aid in the manager’s decision making process. Without good quality readily available information, the other building blocks cannot be improved. Improving HIS is thus central in improving the health system.

The question is whether managers tasked with improving health systems (with improved service delivery as their aim) use available data to make informed decisions? If so, in what way do managers interact with data and how, when and why does data get brought into management discussions? Literature on data use for decision making calls for data to be used as backbone for health system strengthening strategies and calls for managers to start

using data for decision making, but fails to show how it is currently used in district health services (DHS) and what the key factors are affecting the use. In order to promote the use of data (as the WHO suggests) we need to understand the context within which data is used or not used and the reasons for these practises (WHO, 2007). This study will aim to address the gap by examining the culture of data use in the management structures of a district health service.

THE CULTURE OF DATA USE

Nutley and Reynolds (2013) note that the existence of quality data is insufficient to ensure its use (Nutley & Reynolds, 2013). Azubuike and Ehiri (1999) reports that “Effective generation and management of health information should not be seen as an end in itself” The mere fact that information is available, they argue, will not lead to improvements in the health status of patients unless the information is effectively used for improving service delivery (Azubuike & Ehiri, 1999).

Bate (1994) defines “culture” as “the way things are done around here” and argues that “culture is not something that an organisation has but something an organisation is” (Bate, 1994). The culture of data use within the organisation is an important factor for whether data will be used or not, it has an effect on what data is considered important, in what way data is viewed, discussed, and who gets to see what data. It has been argued that the dominant factor in outcome achievement is that of culture. In their article on getting evidence into practise, McCormack *et al.* (2002) argue that “the culture of a practice context needs to be understood if meaningful and lasting change is to be achieved” (McCormack, et

al., 2002). Manley (2000) argues that it is the culture at individual, team and organisational levels that create the context for practise (Manley, 2000).

Based on research by Dunn (1980), Sauerborn (2000) distinguishes between five broad factors that have been shown to play a role in the use of information. These include: the characteristics of the data; the characteristics of the problems and the decisions they require; the organisational or structural characteristics; the cultural differences between “data people” and “decision makers”; and the communication between both (Dunn, 1980) (Saurborn, 2000). The characteristics of the data that play a role include who takes ownership of the data; the relevance of the indicators, the validity and reliability of the data; the detail in the data available at different levels; and the timeliness of feedback. The characteristics of the required decisions for which data may be applicable include factors such as the severity of the outcome of a decision and the time frame in which the decision needs to be taken (Saurborn, 2000). The important issues that determine whether data will be used are thus firstly whether the data is compatible for use and secondly whether the context (data use culture within the system) encourages data use.

At organisational level policies regarding data use may play a role on whether data is used for management by shaping the “culture” of data use. Nutley and Reynolds (2013) argue that without specific policies, guidance and interventions aimed at improving the use of data for decision making, district health systems will not be able to meet the needs of the population they serve (Nutley & Reynolds, 2013).

DATA USE POLICIES

The Western Cape Department of Health (DoH) have identified good quality data as important in their efforts to improving the health system. The department's annual strategic plan for 2012/2013 called for "the need for good quality, auditable data to manage a complex health service". The plan stated that "the process to strengthen information management capacity commenced in 2011 and will continue in 2012". Baseline quality audits were conducted at all facilities to assess compliance with the set of national core quality standards in 2011. These findings will be used as the basis to develop quality improvement plans at institutional level (The Western Cape Department of Health, 2012). The 2013/2014 annual performance plan has identified strategic management capacity as one of 6 strategic goals. The goal is to ensure "management systems are in place to optimally utilise available resources in a coordinated manner" (The Western Cape Department of Health, 2013). The department acknowledges the need for data to inform decision making. Through the Annual Performance Plan the Western Cape Department of Health has set the goal for managers to use data to inform decisions. Managers at all levels are expected to be more involved in interpreting routine reports, and are held accountable to reach treatment targets for services. Do managers bring data into the management discussion? Does data inform their quality improvement plans? This study will contribute knowledge towards such efforts by gathering information on current data use practises within the DoH.

STUDY SETTING: HAST PROGRAM OF THE WESTERN CAPE DEPARTMENT OF HEALTH

The HAST program consists of four disease programs namely the human immunodeficiency virus (HIV) services; the acquired immune deficiency syndrome (AIDS) services; sexually transmitted infection (STI) services and the tuberculosis (TB) services. These services include the prevention, testing and treatment services for these diseases. HIV and AIDS services include the anti-retroviral treatment (ART) services. Since 2004 the HIV/AIDS/STI/TB (HAST) program in the Western Cape has developed good monitoring and evaluation tools that gives managers access to reports with patient level data. Originally the program was managed as a vertical program allowing the development of their own information systems that would supply clinicians and managers with the data they need. For the last few years, integration of these services has been a priority and the focus has been to integrate these systems into the district information systems. Each program within the HAST program has its own monitoring system that produces its own set of indicators that managers have access to.

Electronic ART monitoring system

In March 2011 the South African National Department of Health (NDoH) announced the Three Tier ART monitoring and evaluation (M&E) strategy. The purpose of this strategy was to create a uniformed ART M&E system that consists of a paper based register (TIER 1), a non-networked electronic register (TIER 2) and a fully integrated networked electronic register (TIER 3) for the country. The TIER.net electronic database was identified as the sole

Tier 2 electronic ART Monitoring system (South African National Department of Health, 2011).

Following the successful rollout of the electronic ART monitoring and evaluation system (TIER.Net) in the Western Cape by July 2012, the antiretroviral treatment programme monitoring and evaluation standard operating procedure (ART M&E SOP) was developed by the ART M&E treatment task team of the Provincial Department of Health and implemented throughout the Western Cape Province. This was done to ensure conformity with regards to data capturing, flow, reporting and use across all ART sites in the province. Circular H109/2012 of July 2012 states that “The data elements and indicators can be used at facility level for operational needs”. Several routine reports such as early and late missed appointment reports, defaulter reports, monthly and quarterly reports are now easily generated and readily available to clinicians and managers at the facility, sub district and district level (Western Cape Department of Health, 2012).

Electronic Tuberculosis (TB) monitoring system

South Africa was the first country to implement the Electronic TB Register (ETR.Net). Since 2004 the software has been rolled out to all nine provinces in South Africa. Individual patient records are entered from a standard paper based facility TB Register into a District-based and/or Sub-district-based electronic data entry program. The system allows users to generate different patient lists, based on management and supervision functions, and standard quarterly and annual reports on case finding, sputum conversion, and treatment outcome. (Wamtechnologies, 2007)

Sexually transmitted infections (STI) and Prevention of Mother to Child transmission of HIV (PMTCT) monitoring system

Monitoring of the STI and PMTCT program have been through paper systems that feed into the Primary Health care information system (PHCIS) and the district health information system (DHIS) and is available at a monthly and quarterly basis.

PURPOSE OF THE STUDY

The ultimate goal of routine data feedback is to continuously assess whether targets are met and whether patient care is in line with protocols. The question of whether managers use data to inform the way they work is of great relevance. Thousands are spent by government and not for profit organisations on monitoring and evaluating HAST services. But in order to investigate whether data is used or not will be of no relevance if we don't understand the context within which information is used by managers and the factors that shape its use.

The purpose for this study is thus firstly to deepen our understanding of the context within which information is used by managers and secondly, to understand the factors that shape data use. The aim of the study is to explore the culture of data use in the management structures of the district by investigating how data is used for management in HAST services and the factors that shape the data use practices.

Research question:

What is the culture of HAST data use in the district management structures?

Sub questions:

- 1) When, why and in what way does HAST data get brought into the management discussion?
- 2) Do managers feel that the information produced by the HAST M&E systems are useful in aiding their decision making, and what do they recommend be changed?
- 3) What are the key factors that affect data use practices?

METHODOLOGY

Setting

The study setting will be the largest sub-district within a rural District of the Western Cape.

Based on patient numbers and number of primary health care (PHC) facilities, the chosen sub-district is the largest sub district within the district with the largest volume of data as well as the highest number of managers. We have chosen the sub district as the HAST management team has a long standing working relationship with the researcher who works in the district as a member of a not for profit organisation that provides technical support to the District Department of Health. See population and sampling for further discussion of this issue).

Population and sampling

Our study population will be facility/operational managers, sub district managers, district managers and HAST coordinators working in the two sub districts and district management team. These managers each fulfil a different but equally important role in organising health services in the district and each have access to HAST data on a regular basis.

The study will use purposive sampling to select managers and interview participants.

We aim to attend management meetings at all levels of management in order to observe the interaction of managers and how data is brought into the discussion. These meetings will also serve to purposively sample managers for the interview process.

Table 1. Meetings we aim to attend include:

Facility Level	Sub District Level	District Level
Multi-disciplinary Team Meeting (MDT)	Sub District Management Meeting	Strategic Planning Meeting
Facility Team Meeting	Monitoring and Response Unit (MRU) Meeting	Quarterly HAST Clinical Meeting
	Sub District HAST Meeting	Quarterly HAST Meeting
	Operational Managers Meeting	Monitoring and Evaluation Meeting
	Sub District Team Meeting	PHC Managers Meeting
	HAST Management Meeting	District Management Meeting (DMT)
		Sub District Meetings
		District Managers Committee Meeting (DMC)

The researcher will act as a participant observer and will focus on investigating when data is brought into the discussion, why data is discussed and in what way data is discussed. The sessions will be documented as detailed field notes that will be supplemented by meeting

minutes and any accompanying reports or presentations. A checklist (see attached) will be used as a guide to document the meetings.

The observations will inform which managers will be sampled to have follow-up interviews with and what questions to focus on. Our sampling for the interviews will be limited to managers who attend management meetings. Managers identified for interviews will act as key informants. We will interview managers one by one until no new themes/topics emerge in the analysis. At this saturation point we will stop interviewing more managers.

Managers will be contacted by telephone or during/after the meetings (participant observations) and a meeting date, time and venue arranged. The interviewer will arrange a private room to conduct the interview. Before the interview starts the manager will be informed of the study details and requested to take part in the study. Consent will be taken once the managers have agreed and all procedures have been explained.

Participants will be informed during the consent process that their participation will be entirely voluntary, that they have the right to refuse to participate or to suspend their participation in the course of an interview and that confidentiality will be protected. They will be reassured that there will be no negative or positive consequences of participating or not participating in the study with regards to their work, in relation to their employer. Participants may however feel obliged to give positive answers to certain questions or not answer questions truthfully in fear of breach of confidentiality. This concern will be explained to all participants and explained that the researchers are investigating this topic in order to improve the understanding of how health information is used. This could inform changes in policy and practice on health management. By answering truthfully their response may influence policy decisions that could have a positive impact on the way they

work. The fact that the principal researcher knows the monitoring and evaluation (data capturing, feedback and use) processes well, will be an advantage when results need to be explained within context.

Data collection

The researcher is employed as a Technical Advisor for Monitoring and Evaluation (M&E) in the District by a not for profit organisation. This research project will be conducted concurrently with the researcher's work as technical advisor.

The section 22 not for profit (NPO) organisation is primarily funded by the President's Emergency Fund for AIDS Relief (PEPFAR) through the United States Agency for International Development (USAID). The NPO is a trusted partner of national and local health departments in a number of regions across the country where it provides technical assistance, research, direct staffing support and works with partners to improve the range and quality of health services and impact on the lives of people in need.

As technical Advisor for M&E in the district, the researcher is tasked with supporting the district with improving data management through advising on data collection, analyses and feedback improvements. In this capacity the researcher is well acquainted with the public health sector managers and is currently attending many of these meetings in this capacity.

The managers (participants) at the meetings may feel at ease with the researcher as they know him and is used to him attending meetings. This may provide easier access to the management meetings and may cause the participants to be more at ease with his presence and not change their habits due to a researcher being in the room.

The researcher's affiliation with the NPO and the fact that he is well known in the district may also be a potential problem. It may introduce bias as the researcher is already involved in a supportive role and is already implementing data improvement strategies in the district. Managers may feel obliged to talk about data if the researcher is in the room as he is considered an expert in the district. This may constitute an intervention in itself.

The researcher will aim to limit bias by incorporating a process of reflexivity in order to try and understand this impact on the research process and results. Through this process the researcher will reflect on his own role and identify and analyse the potential bias this may be contributing. This will be done in the research supervision process as well as via occasional feedback of the researcher's impressions at management meetings. The researcher will also inform participants at the meetings and interviews that he is conducting the research for the purpose of an academic study contributing to the researchers' Master in Public Health thesis and not as part of his employer.

The study will be conducted as a mini ethnographic case study using qualitative methods including participant observation, key informant interviews as well as document reviews.

Data collection and analysis will be done simultaneously, with analysis occurring after each observation and semi structured interview.

Participant observation

To fully understand the "culture" of data use for management the researcher aims to attend management meetings at all levels of management. Please see the sampling section for a list of meetings.

Observations will focus on investigating when data is brought into the discussion, why data is discussed and in what way data is discussed as well as how it is used for decision making. The observations will inform understanding of the patterns of information use and help identify factors that influence these patterns.

In depth one on one key informant interviews

In depth interviews will be done by the researcher on a one on one basis. The interviews will focus on answering questions related to:

- 1) What are the requirements for HAST data to be useful to managers?
- 2) What are the key drivers that affect data use practices?

The interviews serve to deepen the knowledge gained from the participant observations. Questions will be mainly open ended in order to give enough space for the interviewer to probe, reflect, clarify, listen and paraphrase. A tape recorder as well as a semi structured interview guide (where the interviewer will make notes) will be used in order to ensure more comprehensive record keeping. Written consent to audio record the sessions will be requested.

Document Reviews

Document reviews will include reviewing agendas and minutes of previous meetings as well as minutes and presentations from participant observations. This will be done to establish a background of what is generally discussed at meetings and how information that is discussed is formally recorded and tracked across meetings. The document review will also

enable the researcher to triangulate the data from the observations and interviews. Agendas and minutes will be requested from the sub district offices of the two sub districts and the district office.

Data Analysis

Field notes from the participant observations will be analysed after completion of each session. The observations will inform understanding of the patterns of information use and help identify factors that influence these patterns. The document review of the meeting minutes and reports will compliment this analysis and will provide another angle to studying the data use patterns. Knowledge gained during the observations will assist the interviewer to probe more efficiently during the interview that will lead to a better understanding of all the aspects around data use for management.

Data from the in depth interviews will be analysed after each interview. Interviews will be transcribed using the recordings as well as notes from the interview. A thematic approach will be followed. The results will be examined for patterns (themes) that are repeated in the results. These themes will be used as categories in order to discuss the results.

Both the observations and semi structured interviews will be analysed and discussed separately and as a whole. Data from observations, interviews and document reviews will enable data triangulation, thus strengthening the evidence and generalizability of the study.

Dissemination of results

The results of this study will be of interest to a number of individuals including the participants, the district and sub district management teams, the information management department of the Department of Health, the ART Monitoring and Evaluation task team at the Department of Health and the TIER.net rollout team at the National Department of Health. The participants will be sent the full text article as well as a non-technical overview by person and/or e-mail. Presentations will also be done at the annual District Rural Research day as well as the annual District Health System Strengthening Conference. These symposia are well attended by managers in the District and will thus serve as feedback to the larger group from which the participants were drawn.

The results of the study will be prepared for publication as a journal article in a social science journal and information management/technology journal.

ETHICS

Ethics approval to conduct the study will be obtained from the Faculty of Health Sciences Human Research Ethics Committee of the University of Cape Town and permission from the Western Cape Department of Health as well as the District Department of Health will be obtained to conduct the study.

Participants will be informed during the consent process that their participation will be entirely voluntary, that they have the right to refuse to participate or to suspend their participation in the course of the observations or interviews and that confidentiality will be

protected at all times. They will be reassured that there will be no negative or positive consequences of participating or not participating in the study with regards to their work, in relation to their employer.

Participant observations

The researcher will make arrangements beforehand with the chairperson of the meeting he plans to attend to do participant observation. He will explain what permission was granted for participation at the meeting and ask the chairperson to allocate 5 minutes at the start of the meeting for the researcher to introduce the study and to get individual written informed consent. Participants who arrive late for or during the meeting will be asked for consent retrospectively at the end of the meeting.

At the start of every participant observation session the participants will be verbally informed (as a group) of the full details of the need and aims of the study as well as all details regarding the methods, dissemination of results and their role in the study by the researcher. Participants will also be informed that the research is for the purpose of an academic study contributing to the researchers' Master in Public Health thesis and not a requirement for his work. Participants will be granted the opportunity to ask the researcher questions regarding the study. Once all participants have had the opportunity to ask questions or clarifications, consent forms and information sheets will be handed out to every participant and written consent taken. Participants will be granted the opportunity to opt out of taking part in the study by opting out of signing the consent form. Observations and comments involving these participants will be excluded from data collection.

The participants who arrive late for or during the meeting will receive (retrospectively after the meeting) an information sheet and the full details of the need and aims of the study as well as all details regarding the methods, dissemination of results and their role in the study will be explained to them by the researcher, before consent will be taken. These participants will be granted the opportunity to opt out of taking part in the study by opting out of signing the consent form. Observations and comments involving these participants will be excluded from data collection. Consent will be taken in the room where the meeting took place. If there is more than one person, a short meeting with each participant will be requested to take informed consent in a private room.

Interviews

Interview participants will be given full details of the need and aims of the study as well as all details regarding the methods, dissemination of results and their role in the study. Participants will also be informed that the research is for the purpose of an academic study contributing to the researchers' Master in Public Health thesis and not as part of his work. Written consent will be taken by the researcher from all persons that will be interviewed. Written consent to audio record the sessions will be requested. Participants will be reassured that they can decline both the interview and or the digital recording, without fear of negative consequences to their work. In the case where a participant declines the audio recording of the interviews only written notes will be taken of the interview.

The consent form will be available in English and any questions (clarity) the participant may have will be answered by the researcher in either English or Afrikaans if requested.

Confidentiality will be maintained by anonymising the data, using codes. Each questionnaire and recording will be given a unique code that will be linked to each participant on a sheet that only the principle researchers will have access to. All identifying information will be removed from the records and all original copies will be stored in a lockable drawer that only the research team will be able to access.

All participants will receive the contact details of the researcher as well as the ethics committee if they have any questions, complaints or comments. This information will appear in the consent form and each participant will be given a copy of the consent for their information.

There will be no reimbursement for participation.

The potential risk of the study

Participant observations and key informant interviews

Sensitive and confidential issues regarding health service delivery in the district may be discussed at these management meetings or during the interviews. Senior managers may feel that this information should not be shared publically or that the information could have an effect on their staff performance ratings or relationships with management or other staff. Managers may feel vulnerable to divulge information regarding their line management or details regarding their own job as a manager in fear of losing their job. Participants will be assured that all results will be presented anonymously and that no personal information

will be made available to more senior management or be presented in a way that it can be linked back to them. No sensitive information will be shared.

There will be no questions asked regarding any personal data so there is no risk with regards to personal patient information. If managers mention any personal patient level data during the interview it will be treated with strict confidentiality. Managers will also be informed at the start of the questionnaire that no personal patient level data will be discussed.

There is a risk that participants may be unclear about the role of the researcher in relation to his role as employee of a not for profit organisation. The researcher would like to clarify that the research is for the purpose of an academic study, contributing to his Master's thesis in public health, and not a requirement for his job.

The potential benefit of the study

There is no direct benefit to participants in this study. The findings in this study will start to fill the gap in understanding when, how, and why data is brought into management discussions and used for decision making with the aim of improving service delivery. Study results may influence future data use policies as well as trainings in order to identify useful indicators and reports that will improve data feedback and use. There is a considerable amount of money spend on collecting data and data systems to streamline these practices. Managers may self-reflect on their own data use and management practices due to the study and have a positive effect on their practices. This study may start discussion and inform future research regarding managers need for routine data to be fed back and the

effects (if any) on their daily job. It may also identify what key elements are needed for effective data use by managers.

BUDGET

Item	Cost
Transport Costs (Fuel)	R850
Printing Costs	R150
Total:	R1000

All costs will be covered by the researcher. Own funds will be used.

TIME TABLE

Planned	Time frame and completion date
Ethics approval	25 April 2014
Western Cape Dept. of Health Approval	6-8 weeks (From 05 May – 16 June 2014).
Study Start	17 June 2014
Data collection	6 months (17 June- 17 December 2014)
Data analyses	Continuously as data is collected. Complete end of January 2015
Complete write up of results	February 2015
Submit for marking	February 2015

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PART B: STRUCTURED LITERATURE REVIEW

OBJECTIVES

The aim of this literature review is to provide context for the study of the culture of data use whilst defining and limiting the problem. The review will place the study in a historical perspective by discussing and summarising the current available literature on data use and the factors that shape data use as well as the gaps in the literature.

The review will start by defining the need for data use followed by a discussion on the factors that shape data use. Finally the need for future research will be discussed.

LITERATURE SEARCH STRATEGY

Google scholar and PubMed were used to identify appropriate published literature. Key words (phrases) included data use; information use; data use culture; information for decision making; health information system performance; quality improvement.

Articles referenced in chosen articles as well as articles that cited the applicable chosen article were searched and reviewed for appropriateness.

Inclusion criteria were all published literature (both electronic and paper) and notes/presentations from conferences, seminars or workshops. Review articles were favoured followed by articles conducted in health settings.

Exclusion criteria were articles not published in English.

STRENGTHS AND WEAKNESSES OF THE CITED LITERATURE

There are limited studies available focusing on data use and especially the organisational and behavioural components of data use, particularly in the South African context. For this reason, the literature presented here have been conducted in a wide range of settings and includes studies from outside the health sector. Work by Theo Lippeveld and his team provide theoretical insights

into the factors that play a role in data use. The Performance of Routine Information Systems Management (PRISM) framework by Aqil et al (2009) forms the basis of the review. The framework has been developed and updated and has been used by others in evaluating health information systems.

REVIEW OF THE LITERATURE

The call for information use for strengthening health systems

The World Health Organisation (WHO) has called for countries to strive for universal health coverage. Strengthening of health systems around the world will be required in order to move towards, and to be able to sustain, universal health coverage, as well as monitor progress. In 2007 the WHO identified six building blocks (or attributes) of a health system that is essential for health system strengthening with the aim of improving quality care and outcomes. These include service delivery, health workforce, health information systems (HIS), medical products, financing, as well as leadership and governance (WHO, 2007). Information systems form the link between the building blocks with information generated a vital means to enable managers to improve decision making around policies, planning and management in each building block. The WHO defines a well-functioning HIS as “one that ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health systems performance and health status” (WHO, 2007). An effective HIS is thus one that produces good quality data that is used to make informed

decisions. Information is essential for decision making at all levels of the health services. Policy makers need information to design policies that make better use of scarce resources. Health planners need information for the design of more effective treatment protocols and programmes. District managers need information for tracking the performance of their facilities and to plan new services and service improvements. Facility managers need information to plan for the daily running of their facility and to ensure community access to their services. Lastly, clinicians need information to provide the right treatment to the right client at the right time.

What influences managers' information use for decision making?

Nutley and Reynolds (2013) define data use as “the analysis, synthesis, interpretation, and review of data as part of a decision-making process, regardless of the source of the data (Nutley & Reynolds, 2013). For this process to occur there needs to be a relationship between management and the information produced and regular interaction with the data in order for the data to aid in the manager’s decision making process. The assumption of the “ideal” information-decision making relationship is that good quality data generated by information systems will be transformed into information that is useful. This in turn will be used to make informed decisions to drive the organisation in the right direction. These decisions will lead to improved functioning and better use of resources which in turn will generate new sets of data in order for the cycle to be repeated. (Sauerborn, 2000) Sauerborn (2000) warns that the information can only guide decisions if it is “relevant, reliable and available for the decision maker in a timely fashion”. Based on research by Dunn (1980), Sauerborn (2000) distinguishes between five broad factors that have been

shown to play a role in the use of information. These include: the characteristics of the data; the characteristics of the problems and the decisions they require; the organisational or structural characteristics; the cultural differences between “data people” and “decision makers”; and the communication between both (Dunn, 1980) (Saurborn, 2000). The characteristics of the data that play a role include who takes ownership of the data; the relevance of the indicators; the validity and reliability of the data; the detail in the data available at different levels; and the timeliness of feedback. The characteristics of the required decisions for which data may be applicable include factors such as the severity of the outcome of a decision and the time frame in which the decision needs to be taken (Saurborn, 2000). The important issues that determine whether data will be used with the aim of improving health system performance are thus firstly whether the data is compatible for use (accessibility and quality) and secondly whether the context (data use culture within the system) encourages data use. Aqil et al. (2009) developed a framework to guide implementers and policy makers with the design, strengthening and evaluation of routine health information systems (RHIS).

Framework for designing, strengthening and evaluating RHIS

In describing their framework (Performance of Routine Information Systems Management (PRISM) framework), Aqil et al (2009) describes a RHIS as a system that is composed of inputs, processes and outputs or performance. The inputs are influenced by technical, organisational and behavioural factors that in turn influence the RHIS processes which effects overall RHIS performance and ultimately health system performance.

Technical factors

The authors define technical factors as: “all the factors that are related to the specialized know-how and technology to develop, manage and improve RHIS processes and performance”. (Aqil, et al., 2009) Technical factors can influence RHIS processes directly or indirectly through behavioural factors. The complexity of the reporting form; HIS design; computer software; and information technology complexity are all technical factors that may affect health system performance. Experts consider health information technology as the main driving force behind improving efficiency and quality of health care with major advances in computer software and knowledge driving HIS changes. (Chaudhry, et al., 2006) Users need to have good information technology skills and knowledge in order to ensure that RHIS are used appropriately. Irrelevant indicators, complex data collection forms and software that is not user-friendly can affect the confidence level and motivation (behavioural factors) of users, affecting RHIS performance indirectly. Poor developed software that does not provide the users with processed data in a timely manner will influence RHIS performance directly by affecting data accessibility and quality. (Aqil, et al., 2009)

The role that technical factors play in HIS performance has been well studied. (MEASURE evaluation 2012) Most studies have focused on the design and implementation of HIS, focussing on ICT infrastructure and processes for improving the production of good quality data for use. (Chaulagai, et al., 2005; Chaudhry, et al., 2006; Lau, et al., 2010) These studies are mainly quantitative in nature measuring data quality and use through the measurement of indicators as well as data generation architecture such as collection, reporting, analyses and flow. In order for data to be used, the literature calls for good data quality,

compatibility and availability. Poor quality data can lead to mistrust of the data by managers which in turn will lead to the data not being used for decision making. Lippeveld (2000) reports that poor data quality is a common reason why managers do not use data for decision making. Managers do not trust the data and therefore do not use it for decision making. There are several reasons for poor data quality. Health workers are the main data collectors and are not always trained in data collecting. Much of the information collected by health workers may not be relevant to their tasks and are perceived to add to their work load without adding value. This could lead to inaccurate data collecting as it is not seen as a priority for health workers in their daily job (Lippeveld, 2000). Managers are often not trained in data management and analyses and may have limited computer skills. This leads to data being interpreted incorrectly or rather not interpreted at all in fear of getting it wrong. (Lippeveld, 2000) The way in which data is presented can also affect the way in which it is interpreted and used. Data is often presented as aggregated numbers or proportions that are difficult to interpret. Managers sign off on reports that they do not understand, and thus, this lack of understanding of the data may act as a disincentive to its effective use in decision-making. (Lippeveld, 2000) Based on the assumption that good quality data will lead to it being used, large amounts of money are spent by governments each year with the aim of improving data quality in order to be able to use the data for planning and decision making. The WHO (1994) warns that: "If information systems do not contribute to health improvements, it's hard to justify their expense".

The question still remains whether good quality data leads to data use. Several authors concur that the existence of quality data is insufficient to ensure its use. (Nutley & Reynolds, 2013; Azubuike & Ehiri, 1999). Azubuike and Ehiri (1999) noted that "effective generation

and management of health information should not be seen as an end in itself”; arguing that the mere fact that information is available will not lead to improvements in the health status of patients unless the information is effectively used for improving service delivery. This implies that even if the data quality is good, its use is not guaranteed.

In order to promote the use of data (as the WHO suggests) we need to understand the context within which data is used or not used and the reasons for these practises (WHO, 2007).

Organisational and behavioural factors

How individuals feel about the usefulness of RHIS tasks along with their confidence, motivation and competence to perform these RHIS tasks all affect whether the task will be performed and the quality with which it will be done. (Aqil, et al., 2009) The behavioural factors that Aqil et al. (2009) propose to have an effect on RHIS performance (as part of the PRISM framework) include: data demand; data quality checking skill; problem solving for HIS tasks; competence in HIS tasks; confidence levels for HIS tasks and motivation. The framework suggests that behavioural determinants are also affected by technical and organisational factors. (Aqil, et al., 2009)

The PRISM framework considers organisational factors to be central in RHIS performance. All members of an organisation work within an organisational context which influences them through the values, rules and practices of the organisation. The PRISM framework defines organisational factors as the factors relating to the organisational structure, resources, procedures, support services and information culture such as governance;

planning; availability of resources; training; supervision; finances; information distribution; and the promotion of culture of information. (Aqil, et al., 2009)

Bate (1994) defines “culture” as “the way things are done around here” and argues that “culture is not something that an organisation has but something an organisation is” (Bate, 1994). This shared organisational “way of doing things” is further defined by Kunda (1992) as “the shared rules governing cognitive and affective aspects of membership in an organisation, and the means whereby they are shaped and expressed” (Kunda, 1992). Geertz (1973) acknowledges that culture has to do with the way ideas are shaped but also emphasises that these ideas effect the actions of the people in the organisation. He defines culture as the “creation of meaning through which human beings interpret their experiences and guide their actions”. (Geertz, 1973) In his book on understanding organisational culture, Alvesson (2002) writes that the cultural dimension is central in all aspects of organisational life. He argues that even in organisations where cultural issues receive little thought, the way in which people feel, think, act and interact are influenced by ideas, beliefs and meanings of a cultural nature. The author explains that culture plays a central role in governing the understanding of “behaviour, social events, institutions and process” at all levels of the organisational levels and that the culture at each level has an influence on the next. (Alvesson, 2002) This view is shared by Manley (2000) who argues that it is the culture at individual, team and organisational levels that create the context for practise (Manley, 2000). In order to influence organisational practise an understanding of the underlying cultural practises of the organisation is thus essential. In their article on getting evidence into practise, McCormack *et al.* (2002) argue that “the culture of a practice context needs to be understood if meaningful and lasting change is to be achieved” (McCormack, et al.,

2002). Organisations need to understand their culture of data use in order to influence the way they use data. Choo (1996) explains that information is such an intrinsic component of almost all activities in an organisation that its function (and the way it is used or not used) has become taken for granted. He states that without institutional knowledge on how the organisation creates, transforms and uses information, the organisation will lack the capacity to manage and integrate this information into knowledge that can drive decisions, process and manage resources effectively. (Choo, 1996) An understanding of the information /organisational culture in an organisation is thus important to the study of information systems as culture plays a role in what data is considered important, in what way data is viewed, discussed, who gets to see what data, whether data will be used or not and how it is employed for strengthening the health information system.

Leidner and Kayworth (2006) conducted a systematic review of culture in information systems research. The authors developed six main themes derived from the review of information technology (IT)-culture research: how culture influences information systems design; how culture influences the adoption and diffusion of IT; the role culture plays in IT use and outcomes; how culture influences IT management and strategy; the impact of IT on culture and IT culture in general. These themes emphasise culture's impact on IT, IT's impact on culture and IT culture in general. They found that the empirical literature largely focused on examining the impact that cultural values have on IT outcomes with two questions being of central importance to inquiry within this theme. The first was whether the same IT used in other settings will have the same outcome. The majority of studies reviewed showed that differences in culture resulted in differences in use and outcomes of IT. The results point out that the cultural values of people within a specific setting shape

how people use information technology. What will work in one setting will not necessarily work in another. The second question was whether a set of cultural values can be determined that are best able to predict user satisfaction and IT implementation success. The results suggest that there is not a set of values or beliefs that hold the key to IT success. Similarity in cultural values among the stakeholders in an organisation is more effective in ensuring use of IT. (Leidner & Kayworth, 2006) In summary, the findings of Leidner and Kayworth (2006) suggest that the existing organisational culture in a setting may play a role on the performance of an IT (such as a RHIS) and that a difference in culture between the different levels of an organisation may cause poor HIS performance. Understanding the current organisational culture at every level of the organisation is thus important if strategies to improve performance were to be implemented.

Little proof of changing organisational culture to improve healthcare performance exists. Parmelli et al. (2011) conducted a systematic review of the effectiveness of strategies to change organisational culture to improve healthcare performance. They found that it is not possible to draw any conclusions regarding the effectiveness of these strategies as they found no studies that fulfilled the methodological criteria for their review. (Pamelli, et al., 2011) The answer to implementing strategies to improve RHIS performance and use may thus not lay in changing the culture of information use but rather in ensuring that the RHIS fits the existing culture and that the cultural values are shared between the different levels of the organisation.

At organisational level policies regarding data use may play a role in whether data is used for management by shaping the “culture” of data use. Without specific policies, guidance and interventions aimed at improving the use of data for decision making, district health

systems will not be able to meet the needs of the population they serve (Nutley & Reynolds, 2013). Decentralizing the information management toward the district level may be one such strategy (policy) to improve the use of routine information at the frontline (Lippeveld, 2000). Lippeveld (2000) suggests that one guiding principle for effective restructuring of a HIS, is the establishment of a culture of information use; and the need for this culture to be developed through participatory and consensus-building processes. (Lippeveld, 2000)

The Health Information System in South Africa

In August 1994 the National District Health System Committee was formed by the South African National Department of Health with the aim of shifting towards a primary health care (PHC) approach. With this approach at the centre of policy development since 1994 the district health system was established in the National Health Act of 2003. The establishment of the district health system was coupled with the decentralisation of health care management responsibilities from central government (national and provinces) to the districts. (Hall, et al., 2005) This process of restructuring the health sector called for the development of an integrated district based health information system in order to monitor progress as well as health outcomes. Towards the end of 1999 projects were initiated to develop and roll out the district health information system (DHIS) in South Africa, and by 2001 the rollout was well on its way. (Hall, et al., 2005) By 2007 the district and sub-district information management teams were well established and data flow as well as data sign off procedures were put in place. With data being produced in the districts the next step was to ensure quality and use of the available information.

The Western Cape Department of Health (WCDoH) have identified good quality data as important in their efforts to improving the health system. The department's annual strategic plan for 2012/2013 called for "the need for good quality, auditable data to manage a complex health service". The plan stated that "the process to strengthen information management capacity commenced in 2011 and will continue in 2012". Baseline quality audits were conducted at all facilities to assess compliance with the set of national core quality standards in 2011. These findings were meant to be used as the basis to develop quality improvement plans at institutional level (The Western Cape Department of Health, 2012). The 2013/2014 annual performance plan has identified strategic management capacity as one of six strategic goals. The goal is to ensure "management systems are in place to optimally utilise available resources in a coordinated manner" (The Western Cape Department of Health, 2013). The department acknowledge the need for data to inform decision making. Through the Annual Performance Plan the Western Cape Department of Health has set the goal for managers to use data to inform decisions. (The Western Cape Department of Health, 2013)

Limited evaluations of South African DHIS quality are available. The available evaluations mainly focused on measuring technical factors that may influence HIS performance such as the availability of ICT infrastructure and the availability and use of data collection tools. The availability of human resources as well as users' lack of knowledge and skills regarding IT systems and tools were identified as the main challenges influencing HIS performance. (Muschel, 1999; Kumalo, 2006; Loveday, et al., 2006; Garrib, et al., 2008; Rohde, et al., 2008; Statistics South Africa, 2009) Loveday et al. (2006) carried out a comprehensive baseline audit of the South African national health focussing on the availability of HIS staff

and their computer capability. The audit results showed that 35% of the HIS staff were not in official permanent HIS posts and that the same percentage had not received training in the DHIS software. Access to computers was found to be low with only 25% of HIS staff members having access to a computer. Many of the available computers used by HIS staff needed upgrading. (Loveday, et al., 2006) Untrained HIS staff members as well as the lack of ICT infrastructure may effect data quality, timeliness and accessibility that may lead may lead to mistrust of the data by managers and result in poor use for decision making. Rohde et al (2008) reviewed the role of information in decision making for primary health care settings. The authors reported that facilities are facing a growing reporting burden and suggested that regular reviews of data sets be done in order to identify and exclude elements and indicators that are no longer useful and include new more appropriate indicators. (Rohde, et al., 2008) The growing reporting burden due to the growing number of indicators may lead to managers with a reporting role spending less time on data analyses and use. In 2009, Statistics South Africa conducted an assessment of the health information system in South Africa, focussing on HIS data indicators, data quality, as well as information dissemination and use among other factors. Indicators as well as data quality was found to be adequate with scores above 75% for indicators and 65% for quality. The evaluators found that data was however not used for implementation and action. Their results indicate that managers at health administrative offices at national, provincial and district levels did not use health information for health service delivery management, continuous monitoring or periodic evaluation. These results were in keeping with the findings of Garrib et al. (2008). In their evaluation of the DHIS in ten clinics in a rural district of South Africa, Garrib and colleagues found that although facilities spent a large amount of time on collecting and ensuring data quality, facilities had little understanding of the

usefulness of data and that data was not used to inform targets or monitor plans. Data was not discussed at staff meetings or analysed by the staff members.

The need for further research

In summary, there is widespread acknowledgement of the importance of a strong HIS for effective and efficient health systems and the challenges associated with achieving this. Despite the large number of studies and systematic reviews available, the evidence for impact of improving routine HIS on quality improvement is limited in places and inconclusive in others. This is partly due to the nature of the problem and methodological challenges. HIS is a complex area for studying effectiveness interventions due to several reasons: there are multiple health systems components interacting simultaneously; outcome variables for HIS performance are not easily measured; a long duration of implementation is required to expect an effect; and it is difficult to compare results due to the wide range of interventions reported on and the difference in organisational setting between studies. Due to these factors, most studies have had a narrow focus. The majority of studies have focussed on the technical aspects of strengthening HIS, especially ICT infrastructure and processes for improving the production of good quality data; and less so on interventions to improve effective use of the data for decision-making and quality improvement. As the PRISM framework suggests, in order to identify suitable interventions for HIS improvement, one need to take into account the technical, behavioural and organisational factors.

This study aims to investigate the culture of data use amongst health managers a rural health District within the Western Cape Province of South Africa. We hope that the

knowledge gained by exploring the current data use practises and the factors that shape its use can aid in finding and implementing better ways to improve data use practices in future.

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The culture of data use in the management structures of a rural health district in the Western Cape Province

ABSTRACT

Background

Health information system (HIS) performance has been defined as “data quality and the continuous use of information. The quality of data, as well as the culture of data use in an organisation has been shown to shape the way data is used. In order to fully understand data use practices with the aim of strengthening the HIS, one needs to first understand whether the context and “culture” in the organisation is conducive to data use. Are the policies, structures, processes and people within the organisation aiding data use? In what ways do managers view and use data?

Aim

In this study, we sought to explore the culture of health information use on a district and sub district management level. The aim was to contribute to the wider knowledge on information use by exploring the data use practices and factors that shape its use among these managers.

Methods

Given the exploratory purpose of the study, we conducted a mini ethnographic case study using qualitative research methods in a rural health district of the Western Cape of South

Africa. The researcher employed ethnographic methods that included participant observation, in depth key informant interviews, document reviews as well as informal conversations to collect data.

Findings

Our findings suggest that there is a strong focus on reporting requirements and technical aspects of producing good quality data. This drive to achieve excellence in production of quality data may be in tension with another important organisational value, which is the need of managers, for ease of access to relevant data, to facilitate decision-making and improvement of health service delivery. Managers' overall experience is of not receiving the health information support they require. Instead, they experienced an organisational culture of using health information to narrowly measure targets and performance. The way this monitoring of targets was done, left managers feeling unsupported, frustrated and demotivated.

Conclusion

We conclude that in our setting where the technical component of producing good data was well performed, was not sufficient by itself to guarantee effective use of data for quality improvements, a factor well recognised in the literature.

Key words: Health Information system, Information use, data use culture; information for decision making; quality improvement.

The culture of data use in the management structures of a rural health district in the Western Cape Province

BACKGROUND

Strengthening of health systems around the world will be required in order to move towards, and to be able to sustain, universal health coverage. In 2007 the WHO identified six building blocks (or attributes) of a health system that is essential for health system strengthening with the aim of improving quality care and health outcomes. These include service delivery, health workforce, health information systems (HIS), medical products, financing, as well as leadership and governance (WHO, 2007). Good health information systems will be crucial in achieving universal health coverage and will require continuous evaluating and strengthening. Information systems form the link between the building blocks with information generated through routine systems being a vital means to enable managers to improve decision making around policies, planning and management. More in-depth study of the dynamics of using information for decision-making can contribute to our understanding of how to strengthen routine health information systems.

Performance of Routine Information Systems Management (PRISM) framework

The impact of interventions to strengthen routine health information systems (RHIS) is complex to assess, given that there are multiple influences from the different health system components, many stakeholders involved and a long duration of implementation is required for interventions to show an effect (Lau, et al., 2010). Conceptual frameworks are useful to

guide investigations by ensuring a more systematic approach to the investigation and analysis of findings. Frameworks allow for a coherent and common set of concepts to be used in the analysis, which allow for greater comparability and transferability of findings across settings.

The Performance of Routine Information Systems Management (PRISM) framework, developed based on empirical research by Aqil et al. (2009), filled the need for defined criteria for developing and evaluating information systems (Aqil, et al., 2009). The PRISM framework provides a new direction in analysing RHIS performance by moving from assessing only technical factors such as information needs, indicator applicability, data collection tools and information communication technology (ICT) to including the behavioural and organisational factors that play a role in RHIS performance.

Aqil et al. (2009) describes a RHIS as a system that is composed of inputs, processes and outputs or performance (see Appendix for a diagram). The authors define RHIS performance (outputs) as “improved data quality and continuous use of information” and explain that RHIS performance is influenced by processes such as data collection, transmission, processing, analyses, display, quality checking and feedback which in turn are influenced by inputs. The inputs are the basic determinants of RHIS and are influenced by technical, organisational and behavioural factors.

Technical factors are defined as: “all the factors that are related to the specialized know-how and technology to develop, manage and improve RHIS processes and performance” (Aqil, et al., 2009). Irrelevant indicators, complex data collection forms and software that is not user-friendly can affect the confidence level and motivation (behavioural factors) of

users, affecting RHIS performance indirectly. Poor developed software that does not provide the users with data in a timely manner will influence RHIS performance directly by affecting data accessibility and quality (Aqil, et al., 2009).

The relationship between producing good quality data and the use of data for decision-making

The role that technical factors play in HIS performance has been well studied. (MEASURE evaluation 2012; Lau, et al., 2010). Most studies have focused on the design and implementation of HIS, focussing on ICT infrastructure and processes for improving the production of good quality data for use. (Chaulagai, et al., 2005; Chaudhry, et al., 2006; Lau, et al., 2010). These studies are mainly quantitative in nature, measuring data quality and use through the measurement of indicators as well as data generation architecture such as collection, reporting, analyses and flow.

In order for data to be used, the literature calls for good data quality, compatibility and availability. Poor quality data can lead to mistrust of the data by managers which in turn will lead to the data not being used for decision making. (Lippeveld, 2000) Sauerborn (2000) states that the assumption of the “ideal” information-decision making relationship is that good quality data generated by information systems will be transformed into information that is useful. This in turn will be used to make informed decisions to drive the organisation in the right direction. These decisions will lead to improved functioning and better use of resources which in turn will generate new sets of data in order for the cycle to be repeated. (Sauerborn, 2000)

Several authors concur that the existence of quality data is insufficient to ensure its use and that information availability itself will not lead to improvements in the health status of patients, unless the information is effectively used for improving service delivery. (Azubuike & Ehiri, 1999; Nutley & Reynolds, 2013) Azubuike and Ehiri (1999) noted that “effective generation and management of health information should not be seen as an end in itself”. The implications are that even if the data quality is good, its use is not guaranteed and for data quality to become good, managers should interact with the data; it should be used and demanded, and managers should give feedback on how to improve its usefulness. The importance of this interaction between technical production of data and effective use of data is captured in the behavioural components described in the PRISM framework. Behavioural factors include data demand; data quality checking skill; problem solving for HIS tasks; competence in HIS tasks; confidence levels for HIS tasks and motivation (Aqil, et al., 2009). How individuals feel about the usefulness of RHIS tasks along with their confidence, motivation and competence to perform these tasks, affect whether the task will be performed and the quality with which it will be done (Aqil, et al., 2009).

The culture of data use

Another component contributing to the ‘culture’ of data use is organisational factors. All members of an organisation work within an organisational context which influences them through the values, rules and practices of the organisation. The PRISM framework defines organisational factors as the factors relating to the organisational structure, resources, procedures, support services and information culture such as governance; planning;

availability of resources; training; supervision; finances; information distribution; and the promotion of culture of information (Aqil, et al., 2009). The framework suggests that behavioural determinants are affected by both technical and organisational factors.

Others have similarly identified the 'culture' of information use as important for effective use of health information. Bate (1994) defines "culture" as "the way things are done around here" and argues that "culture is not something that an organisation has but something an organisation is" (Bate, 1994). Alvesson (2002) writes that the cultural dimension is central in all aspects of organisational life. He argues that even in organisations where cultural issues receive little thought, the way in which people feel, think, act and interact are influenced by ideas, beliefs and meanings of a cultural nature. (Alvesson, 2002) An understanding of the information /organisational culture in an organisation is thus important to the study of information systems as culture plays a role in what data is considered important, in what way data is viewed, discussed, who gets to see what data, whether data will be used or not and how it is employed for strengthening the health information system.

Leidner and Kayworth (2006) conducted a qualitative systematic review of culture in information systems research and found that a main theme was the impact of culture's impact on information technology (IT). Two important questions were raised in the review. The first was whether use of the same IT different settings would have the same outcome. The majority of studies reviewed showed that what worked in one setting did not necessarily work in another. Differences in culture resulted in differences in use and outcomes of IT. The results point out that the cultural values of people within a specific setting shape how people use information technology. The second question was whether a set of cultural values can be determined that are best able to predict user satisfaction and IT

implementation success and found that the results suggest that there is not a single set of values or beliefs that hold the key to IT success. Similarity in cultural values among the stakeholders at different levels in an organisation may be more effective in ensuring use of IT (Leidner & Kayworth, 2006). Understanding the culture of information use in an organisation at every level of the organisation is thus important if strategies to improve performance were to be implemented. The importance of understanding organisational culture for successful implementation of new interventions is also recognised; McCormack et.al. (2002) commenting on success factors for new interventions noted that “the culture of a practice context needs to be understood if meaningful and lasting change is to be achieved” (McCormack, et al., 2002).

There are gaps in our knowledge on how to improve organisational culture and on the effectiveness of changing organisational culture for improving health systems. Parmelli et al. (2011) conducted a systematic review of the effectiveness of strategies to change organisational culture to improve healthcare performance and found that it is not possible to draw any conclusions regarding the effectiveness of these strategies as they found no studies that fulfilled the methodological criteria for their review. (Pamelli, et al., 2011) A review conducted by Lau et al (2010) assessing evidence from systematic reviews on effectiveness of RHIS interventions, found that there is some evidence for improved quality of care but in varying degrees according to the topic area. (Lau, et al., 2010). Few of the studies reviewed focussed on effective data use and rather on technical components of producing good quality data.

The South African District Health Information System (DHIS)

In South Africa, the limited evaluations of the DHIS have mainly focused on measuring technical factors that may influence HIS performance such as the availability of ICT infrastructure and the availability and use of data collection tools. Evaluations identified a range of challenges influencing data use and HIS performance in South Africa including lack of human resources, outdated and/or lack of ICT infrastructure, high reporting burden on managers and users' lack of knowledge and skills regarding IT systems and tools. (Muschel, 1999; Kumalo, 2006; Loveday, et al., 2006; Garrib, et al., 2008; Rohde, et al., 2008; Statistics South Africa, 2009)

In summary, there is widespread acknowledgement of the importance of a strong HIS for effective and efficient health systems and there is acknowledgement of the challenges associated with achieving this. Despite the large number of studies and systematic reviews available, the evidence for impact of improving routine HIS through quality improvement is limited in places and inconclusive in others. This is partly due to the nature of the problem and methodological challenges. RHIS is a complex area for studying effectiveness interventions due to several reasons: there are multiple health systems components interacting simultaneously and a long duration of implementation of interventions is required to expect an effect. Outcome variables for HIS performance, such as production of good quality data and the effective use of data for decision-making may be difficult to measure. Finally, it is difficult to compare results due to the wide range of interventions reported on and the difference in organisational setting between studies. HIS studies, including in South Africa, have focussed largely on the technical aspects of strengthening HIS (especially ICT infrastructure and processes for production of good quality data) and less

organisational and behavioural interventions to improve effective use of the data for decision-making and quality improvement. As the PRISM framework suggests, in order to identify suitable interventions for HIS improvement, one needs to take into account not only the technical, but also the behavioural and organisational factors.

This study investigated the culture of data use amongst health managers in a rural district within the Western Cape Province of South Africa. Our goal was to explore the way in which health managers interact with data (and each other around data) and how, when and why data is brought into management discussions and decisions. This study addresses the gap in knowledge about the behavioural and organisational aspects of using health information to improve health system functioning. We hope that the knowledge gained by exploring the current data use practises and the factors that shape its use, can aid in finding and implementing better ways to improve data use practices in similar settings.

METHODS

Given the exploratory nature of the research questions, we conducted a mini ethnographic case study using qualitative research methods in the largest sub-district of rural district of the Western Cape of South Africa. The case study approach was chosen as it allows a phenomenon to be investigated in its real life context using multiple forms of evidence (Yin, 2009) and provide a “thick description” and rich details of social phenomena (Geertz, 1973).

Sampling

The district was chosen based on convenience as it is the health district that the researcher works in. The sub-district was purposively selected as it is the largest sub-district within the district, with the highest number of clients and primary health care (PHC) facilities. The sub-district management team is well established and has a long standing working relationship with the researcher who works in the district as a member of a not-for-profit organisation that provides technical support to the district department of health. Access to management meetings and interviewees was aided by this pre-existing working relationship.

Our study population included sub-district managers, district managers and HIV/AIDS/STI/TB (HAST) coordinators working in the sub-district and district management teams. These managers each fulfil a different but equally important role in organising health services in the district (see Figures 1 and 2). Managers were chosen according to their management role within information management, HAST services and the district management in general.

Data collection

The researcher employed rapid ethnographic methods that included participant observations at key events (e.g. management meetings), in-depth key informant interviews, document reviews as well as informal conversations with a wide range of participants.

Participant observation

Participant observation of management meetings at all levels of management were conducted in order to identify the context, views and practices that relate to data use in the district. Meetings with a HAST or general management focus were chosen as these were the meetings where issues regarding service delivery and trends in burden of disease were likely to be discussed. The meetings served as a forum where managers could be observed in their “real life context”, interacting with each other, discussing challenges and progress and illustrate how they interact with data.

Most meetings were attended more than once over a period of nine months (see Table 2 in context section). Longitudinal observation was to allow for enough time for patterns of behaviour to be identified and to explore factors that shape data use.

A semi-structured framework was used for collecting notes during meetings to add structure, focus and consistency to the note taking (see annexure). Additional notes from observations of meetings and conversations were recorded in a field notebook. After each meeting, the researcher reviewed the notes and filled in details from memory, as appropriate. Ad hoc conversations with attendees during meetings informed the research process and added insights into the organisational setting and data use culture.

Key informant interviews

In order to deepen the knowledge gained from participant observation and validate themes identified during the observation and document reviews, we conducted semi-structured, in-depth interviews with six purposively selected health managers. Interviews were started after six months of observations and when preliminary steps of analyses were completed. The questions were adapted as the study progressed; with themes emerging from participant observation and from earlier interviews. Managers were asked questions regarding the history of data management, management structures, reporting lines, working relationships, access to data, data policies, data feedback and data use.

Interviews were recorded upon consent. A reflective summary of each interview was written in a field notebook after each interview. These summaries added depth to the analyses as they contained the researcher's first impression of themes that were identified during the interview as well as questions that remained unanswered.

Document Reviews

Document reviews of agendas and minutes of attended and previous meetings were conducted. These provided insights into the structure of meetings as well as a short history of data use practices in meetings.

Data analyses

A process of thematic analyses was used to develop themes identified in the data. The PRISM framework was used to give structure and guide the analyses of the developing themes. (Gale, et al., 2013) The preliminary steps of analyses involved the researcher reading through the field notes of the observations as well as the document reviews in order to get an initial sense of the data and to identify issues to consider during the interviews. Possible themes identified were added as discussion points to the interview guide in order to test them further. Analyses of initial observations informed later observations, with themes developed tested at subsequent meetings. Interviews were transcribed by the researcher and coded in order for themes to be identified. Summaries made after interviews and observations were analysed with the full transcripts of interviews. Themes identified were tested and reviewed during regular data discussion sessions with study supervisors. Data collection was stopped after no new themes emerged. The different data collection methods allowed for triangulation of data by cross verifying themes identified between the observations and interviews.

As context is such an important part of this study, we chose to present findings by starting with presenting the context of our study setting. This was followed by the three main themes that describe our understanding of the culture of data use in the district. These themes were framed by three main quotes from interviews and observations.

Reflexivity

As a staff member of a not for profit organisation working in the district, the researcher is actively involved in health and information system strengthening practices in the district, and was known to most participants at meetings and to all the interviewees. This had the possibility of having positive and negative effects on the study. Interview times and dates were easily granted by interviewees. Through their working relationship, the researcher and interviewees had already developed rapport and therefore may have been more open to discussing sensitive issues during interviews that would otherwise be more difficult to prompt. The researcher had good knowledge of the way in which the department of health functions, management structures and the roles and responsibilities of the interviewees. This allowed the researcher to probe more applicably during interviews. Attendees at observations may have been more comfortable with the researcher and therefore not changed their habits due to feeling 'observed'. This was evident in the fact that the researcher was often asked to comment on issues that were raised during meetings and was therefore not seen as an 'outsider' at the meetings.

There was the danger of the researcher's own occupational interests and views influencing the data collection and analyses. The researcher made it clear at every meeting he attended and interview conducted that he is conducting the research in his capacity as a researcher and not an employee of a not for profit organisation working in the district. Remaining conscious of this during data collection and analyses, and the involvement of supervisors in the research process, enabled some degree of reflexivity.

Ethical approval

Ethical approval to conduct the study was granted by the Faculty of Health Sciences Human Research Ethics Committee of the University of Cape Town and permission from the Western Cape Provincial and District Departments of Health was granted in April 2014 to conduct the study. (HREC REF: 075/2014)

RESULTS: THE CONTEXT OF DATA USE IN THE RURAL DISTRICT

We set out to investigate the way data is used for decision making and the factors that shape data use. In order to do so we first needed to understand the district management structure as well as the data flow policies in the district and sub-district as these play an important role in the culture of data use by affecting who receives data, in what format and ultimately how data is used

Summary of participants

At district level the deputy director for comprehensive health was interviewed as she is in charge of the directorate that include all programmes and primary health care services; the senior family physician as she plays an important role with regards to the medical management of the HAST programme in the district; and the assistant director for Information management as she heads the information management department and has

more than ten years' experience in this role (see Table 1 and Figure 1 for management organogram).

At sub-district level the PHC manager was chosen as she is in charge of the sub-district and therefore is expected to use data; the HAST coordinator as he is in charge of the HAST programme and has both information and management roles; and the information officer as she was able to add the information management perspective on data flow and managers' data requests (see Table 1 and Figure 2 for management organogram).

Table 1. Description of key informant interview participants

Title	Responsibilities	Link to routine data validation loop
District Level		
Deputy Director: Comprehensive Health Services	Heads the comprehensive health directorate that manages all primary health care services and disease programmes.	No validation role
Senior Family Physician	Senior medical manager. Duties include ensuring clinical governance.	No validation role
Assistant Director: Information Management	Heads the information management department within the support services directorate. Ensures quality collection, collation and reporting of data.	Ensures data is signed off for validation at every health level
Sub-District Level		
Primary Health Care (PHC) Manager	Manages the sub district.	Signs off all validation reports for sub district data
Sub-district HAST coordinator	Coordinates the HAST programme with regards to the clinical and information management.	Dual management and information role. Collates, analyses and reports on HAST programme data. Ensure validity of HAST data sets.
Sub-district Information Officer	Coordinates the information management process for the sub district.	Ensures data is signed off for validation at sub-district level

The District Health System

In August 1994 the National District Health System Committee was formed by the South African National Department of Health with the aim of shifting towards a primary health care (PHC) approach. With this approach at the centre of policy development since 1994, the district health system was established in the National Health Act of 2003. The establishment of the district health system was coupled with the decentralisation of health care management responsibilities from central government (national and provinces) to the districts (Hall, et al., 2005). The District Health Department was formed by combining parts of two regions. The district comprises five sub-districts and is one of five rural districts of the Western Cape Province, South Africa.

The District Health Management Structure

The health district is headed by a district director that has a team of deputy directors each managing one of five directorates (see Figure 1 below). The comprehensive health services directorate (see Figure 1 below) includes all PHC services including the fixed facilities and mobile services whereas the other four directorates include PHC services and hospital-based services. The comprehensive health services directorate is managed by a deputy director who has a set of coordinators managing each health programme in the district. Information management for all health services (not only PHC services) in the district falls under the professional support services directorate and is headed by an assistant director who manages a small team of district information officers.

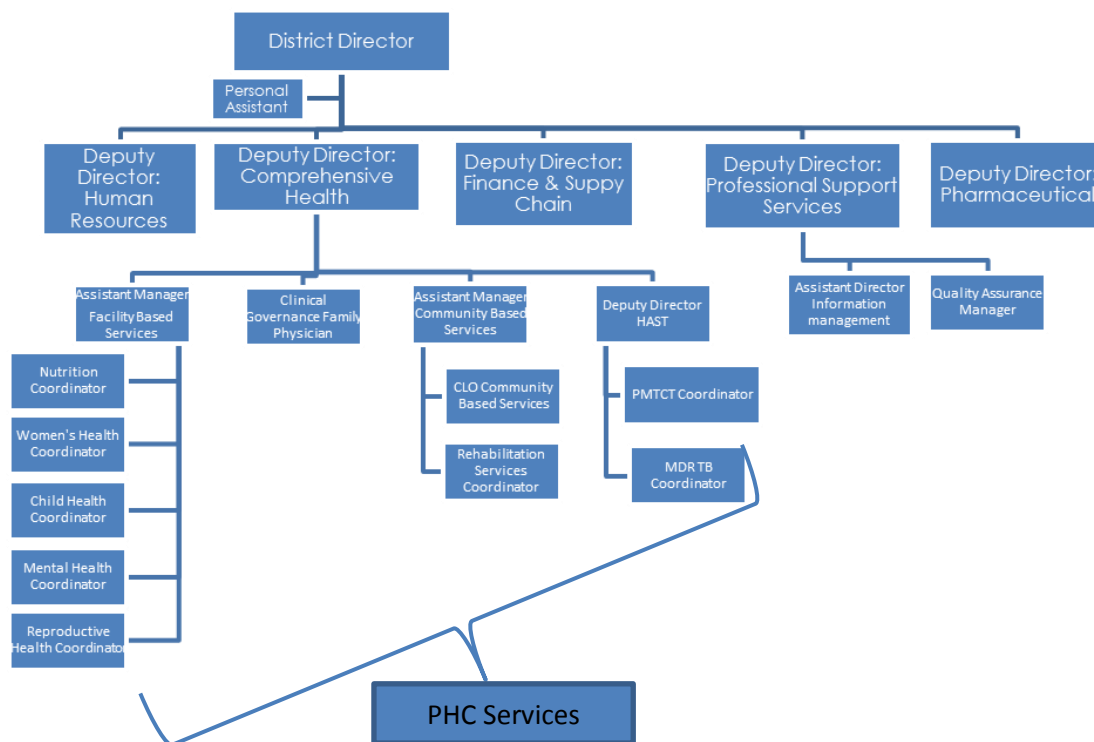


Figure 1. The District Health Management organogram

The organogram illustrates the five directorates that form the district health management team. For the purpose of this study the comprehensive health and the professional support services have been illustrated to lower levels. The comprehensive health services directorate only have functions with regards to the primary health care services whereas the other four directorates also have functions that include both primary health care and hospital services.

Source: This diagram was developed using information gathered from key informant interviews as well as e-mail correspondence with key district staff members.

The Sub-district Health Management Structure

The sub-district has the most fixed primary health care facilities in the district with more than 300 staff members delivering an array of primary health care services. The sub-district is headed by a primary health care manager (who reports directly to the district director) who has two assistant managers each managing a group of facility managers (see Figure 2 below). The HAST programme is managed by a HAST coordinator who manages a set of

response staff (that includes nurses assisting with the different programs that forms the HAST programme) and an administration clerk.

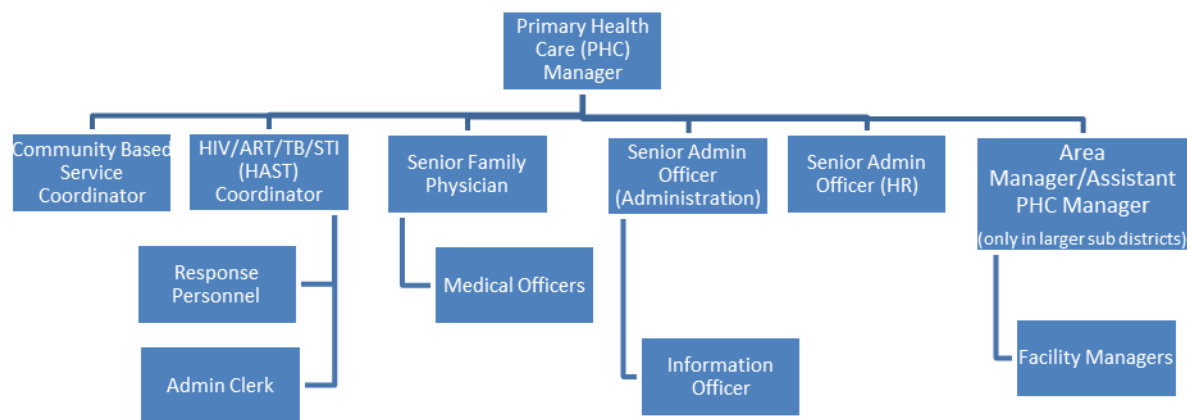


Figure 2. The Sub-district health management organogram

The diagram illustrates the management structure of the sub-district health services. The PHC services (facilities) are managed by two assistant PHC managers, the medical services by a senior family physician, the administration services by two senior administration officers (one general administration and one HR), the HAST programme by a HAST coordinator and the community based services by a coordinator.

Source: This diagram was developed using information gathered from key informant interviews as well as e-mail correspondence with key district staff members.

District Health Information System

The process of restructuring the health sector called for the development of an integrated district based health information system (DHIS) in order to monitor progress as well as health outcomes. Towards the end of 1999 projects were initiated to develop and roll out the DHIS in South Africa, and by 2001 the rollout was well on its way (Hall, et al., 2005). Part of the rollout was the establishment of information management departments at district and sub-district levels. The assistant director for information management explains that

before the establishment of the sub-districts as part of the district health format, data would flow directly from the facility to the district. With the assistance of one clerk, she would then collate and verify data from the facilities, compile reports and send it to the provincial level.

By 2007 the district and sub-district information management teams were well established and data flow as well as data sign off (validation) procedures were put in place (see Figure 3 below). What these teams measure and how they report however are still decided at a higher level. The district assistant director for information manager explained that indicators are set bi-annually by the national department of health in what is called the national indicator data set (NIDS). The provincial department of health then adds a few indicators to what is then termed the provincial indicator data set (PIDS). The PIDS have to contain all the indicators in the NIDS. The district has the option to add a few indicators, but is usually cautious as this increases workload which in turn can lead to poor data quality and audit complications.

Routine data flow policy

The routine data flow starts with data collected daily at facility level on routine monitoring sheets that are collated per facility (see Figure 3 below). These collated paper records are forwarded to the sub-district office, where data capturers enter the paper-based information on the digital web-based system (some larger sites such as the community day centres (CDCs) capture on site), draw validation reports and send reports to district level. As part of the routine data flow at various steps, managers receive data and confirm its validity

(the latter is referred to as 'data sign off'). Data is signed off at facility, sub-district, district and provincial levels on a monthly basis after data quality checks have been done. At facility level the facility manager signs off the data as a true reflection of services rendered. At sub-district level the PHC manager signs off the data as a true reflection of all services rendered in the sub-district and at district level the district director is responsible for the sign off.

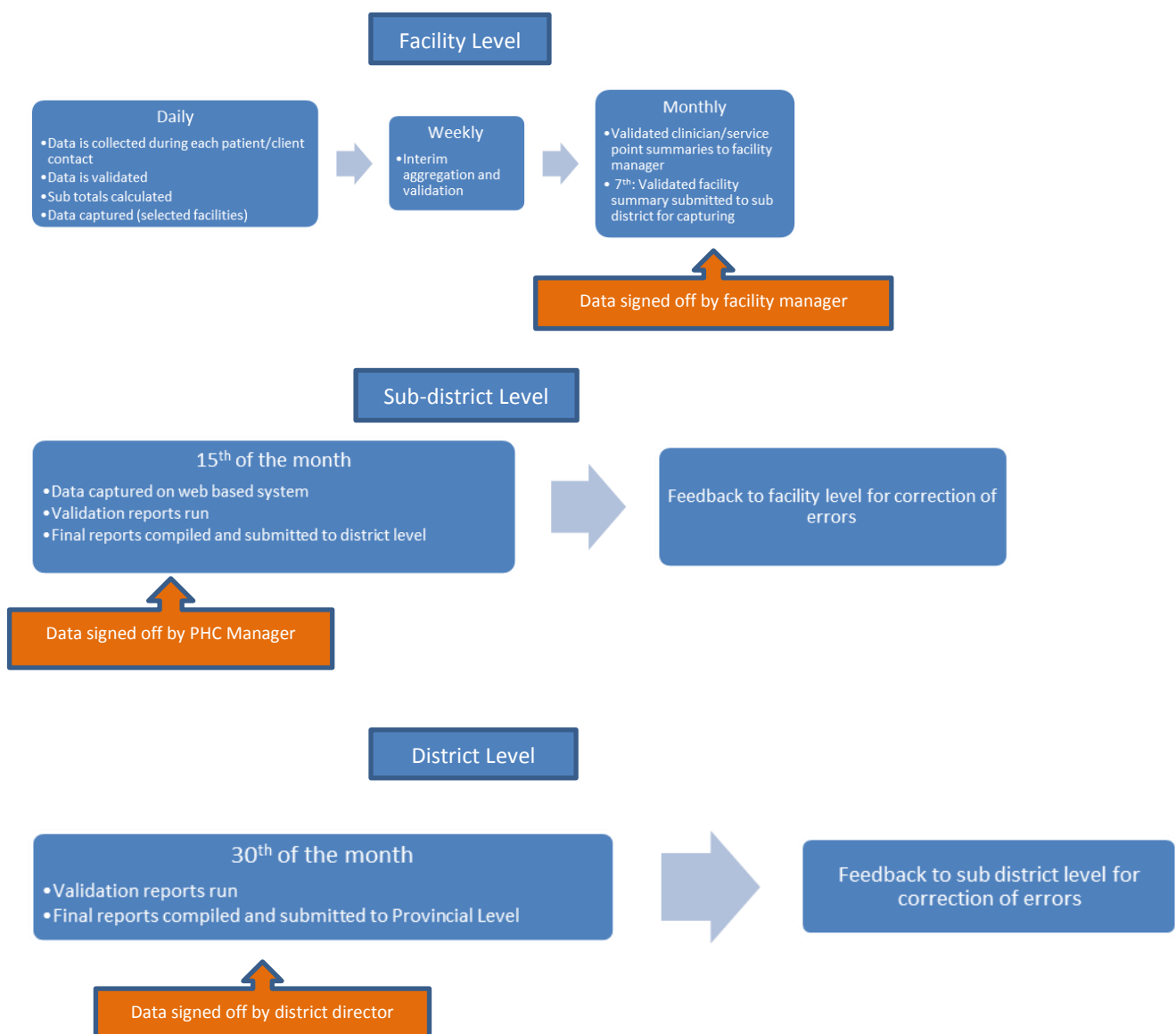




Figure 3. Routine District Health data flow and validation (sign off) procedures

At every level of the health department the data is validated and signed off by the appropriate manager before being sent to the higher level. Errors are fed back to the level below for correction. This process is slow with data only being signed off for use at district level 30 days after the end of the reporting period and only reaching national levels 50 days after the end of the reporting period. Managers who are not part of this routine flow can only request data after the district director has signed off the data as valid.

Source: This diagram was developed using information gathered from key informant interviews, e-mail correspondence with key district information management staff members and the Western Cape Department of Health Circular H183 of 2012.

The routine data flow policy (see Figure 3 above) does not include managers such as programme managers or coordinators who are not in charge of health units (facilities or sub-districts). Managers, who are not part of this routine loop, need to request data on an ad hoc basis via their respective level's information management office once the data has been signed off or receive data via an informal route such as attending management meetings.

Meetings as data feedback mechanisms

Management meetings serve as a forum where data is presented and discussed as part of the larger agenda. The agenda of the majority of meetings have allocated agenda points for discussion of programme diseases, burden of disease and data feedback. The aim, attendees and frequency of meetings attended as part of participant observations are summarised in Table 2 below.

Table 2: HAST related management meetings: Aims, attendees and leadership.

Meeting	Aim of the meeting	Attendees	Leadership/Chair	Number of meetings attended for observations
District Level				
Quarterly Monitoring and Evaluation (M&E)	Review and discuss district data from the previous quarter	Sub-district and district primary health care, hospital, medical and programme managers	District Director	3
Bi-Monthly HAST	Review the running of the HAST program in the district	HAST manager, sub-district HAST coordinators, PMTCT coordinators, MDR TB coordinator and district family physician	HAST Manager	1
Sub-district Level				
Monthly Management Team	Strategic meeting where managers discuss operational issues	Sub-district management team and programme coordinators	PHC Manager	2
Monthly Monitoring and Response (MRU)	Clinical and programme issues are discussed within disease programmes	Sub-district managers, facility managers, program coordinators and non-profit organisations	PHC Manager	5
Quarterly HAST	HAST coordinator shares changes in protocols, challenges identified, new projects to be launched and other matters arising with attendees	Facility managers, programme and clinical staff members as well as programme coordinators	HAST Coordinator	2

Source: This table was developed using information gathered from document reviews from previous meetings' agendas and minutes, correspondence with key sub-district staff and data gathered as part of the participant observations.

THE CULTURE OF DATA USE

Are management's health information needs fulfilled?

"What I have been fighting for since I've been here for the last two and a half years... the information management department should be my support. I am their client. And if I need something they should be able to listen. They should react according to my needs. They should supply me with the correct, verified data so that I can make decisions fast. I need to make decisions and I can't always get the stuff from them. So now I get it by myself." Deputy Director: Comprehensive Health Services

Managers on district and sub-district level expressed a strong need for health information that can help them make decisions. They however, felt that their need for information is not always being fulfilled, due to inaccessibility of information, as expressed by the Deputy-director of Comprehensive Health Services, above. When she described her frustration with trying to access the health information she needs, her body language conveyed discouragement. She is responsible for all primary health programs delivered at district level and appeared disheartened by having to struggle to access data quickly and in the format she needed it. She has tried to change the system since being appointed in her role two and a half years ago, but feels she has failed.

In describing her role as a manager she painted a picture of herself as someone who sits in a giant excavator with many arms. She has all the controls and has to decide which arm to

move where in order to effect change. But she needs information to know where to move the soil and what arm will be best suited for the job. And this is a struggle for her. She is struggling to get data through the prescribed channels via the sub-directorate for Information management (see organogram in Figure 1). As she pointed out earlier, she does not feel the information sub-directorate is providing the support she needs to access useful data in a timely fashion.

There appears to be two issues contributing to her difficulties with accessing the information she needs for making management decisions. The first is that she is not part of the routine data flow system. Information management is a sub-directorate within Professional Support Services (see Figure 1) and they are responsible for managing the collation, quality control and distribution of the health information for the entire district. The District Director reviews and signs off final district reports (see figure 3, District Level), without needing to have the Deputy-director as part of the data flow. According to the Deputy, she therefore has to request data through the information management department on an ad hoc basis, which she found to be time-consuming.

The second problem is that the data she receives is not always suitable for her needs. By the time she receives it, it is often too outdated to inform decision making. In response to this challenge, she created her own data feedback loop that allows her to receive data quicker and in the format that she can use. This involves asking program coordinators (nutrition, women's health, child health, mental health and reproductive health) in her department to compile their own reports and graphs by drawing on raw data from the routine electronic systems. (See Figure 1 for management lines between programme co-ordinators in facility-based services, and the Deputy-director). She admits that not all programme coordinators

have the required skills or time to draw graphs, analyse the data and make decisions based on findings. Nevertheless, she has found using this separate system quicker and more effective than drawing on the information management department for information support.

The Primary Health Care (PHC) manager at sub-district level expressed a similar need for health information for decision-making. She felt that although she is part of the routine data loop, she often needs to request extra health information. By contrast, she found the information to be fairly accessible, explaining that the sub-district information officer is very helpful with ad hoc requests:

“I have to ask for many of the stuff. It is not a given that I receive it. I can directly contact the information officer and ask: “Listen, I would like this data quickly.” And I get it quick. She is very sharp [proficient] with the data” Sub-district PHC Manager

These contrasting experiences of data feedback and accessibility may be explained by uneven implementation of data request policies. At district level a data request policy has been implemented that requires the district managers to give the district information office four days’ notice in order to receive data in the format they have requested. District information management have created the four day data request policy, in order to be able to cope with the requests in addition to their daily work, but have in doing so, limited managers’ accessibility to timely data. At sub-district level, however, this policy has not been implemented.

The accessibility of health information on sub-district level (as compared to the district level) may also be related to two other factors. Firstly, the sub-district PHC manager pointed

out that she is part of the data flow loop (See Figure 2, Sub-district Level), and she in fact needs to sign off on sub-district level data. A related issue to consider is the issue of reporting lines and line management functions. For instance, in figure 2, the sub-district PHC manager has direct managerial oversight over the information officer which may make it easier to elicit the information support required. At district level, the Information sub-directorate reports directly to the District Director and not to other managers. This lack of line management authority may make it more difficult for managers to elicit the information support they require. (See organogram in Figure 1). Although the issue of line management authority over the Health information sub-directorate was not directly commented on in the interviews, indirect references point to perceptions of the Information-directorate as a fairly autonomous department; which sometimes resulted in a clash of needs with managers from other sectors of district health. This issue also emerged with regards to the tension between needs of 'data people' and 'action' people, as discussed later.

In his paper on routine health information systems, Theo Lippeveld (2000) writes that "to be relevant, a health information system must fit into the organisation of the health system for which it generates information". Identifying the information needed to make decisions at each management level followed by obtaining and presenting this information to the right people at the right time is essential if an organisation has the goal of using information to guide decision making and organisational progress. (Lippeveld, 2000) This responsiveness does not seem to be the experience of the managers interviewed. The current district data flow system provides clear endpoints for signing off by managers, which provides for quality checks along the way. While this system may work well for checking technical quality, it is not clear how much the data flow system is focused on feedback for data use. For example,

managers who receive the data, receive it with the aim of checking validity and signing the data off as a true reflection of services rendered. If routine reports were generated based on management needs and made available to all managers (not only those that are part of the data flow policy) as Theo Lippeveld suggests, the burden of had hoc requests may be less and the managers' information needs may be fulfilled.

Using health information to measure targets: What is missing?

"Just to prove that you do your job and what you do. It is almost as if, yes, there is a target and I should measure it. There is a target and I should measure it. Do you understand? It is not at all, used to make decisions or for managing. (sigh). Sounds very depressing." Deputy Director: Comprehensive Health Services

"I want to see people putting indicators together. You know what I mean...to make information about a situation. You need a different approach. There is a different gap there...for each indicator there are feeder things that impact on that. So where is that clinical feeder stuff? Wouldn't that be nice to see at the district M&E meeting?"

District Senior Family Physician

Managers expressed the view that much of their use of routine information is directed towards evaluating whether they have met various targets in the district or not. When data is discussed or performance reviewed it is often based on progress towards targets. They are uncomfortable with the focus on target driven performance as they feel that it detracted from both the broader decision making about improving services and from a sense of individual patient care.

According to interviewees, using health information to measure progress towards targets not only detracts the focus from improving the quality of patient clinical care; it also acts as a disincentive. Managers and staff members experienced this particular way of using health information (measuring against targets), punitive. The main forum where managers meet from across the district to discuss performance is the District M&E meeting (See table 2). An information management team member described the goal of the district M&E meeting as follows:

“To show them whether they are showing progress or not. And then they should discuss if they had any problems, why they didn’t reach a target.” Assistant Director:
Information Management

The M&E meeting has become a forum to present progress toward targets and to discuss the reasons for not meeting targets. It is not experienced as receiving information support for decision-making, but rather as showing up faults and public interrogation. To illustrate how this unfolds at one M&E meeting: the assistant director of information management presented the previous quarter’s progress towards targets per sub-district under an agenda point entitled: “burden of disease”. The presentation is started with a review of sub-district data submission times and data quality. This is followed by a review of the indicators that form part of the annual performance plan. Data is presented in the form of progress towards targets. Targets reached are met with applause while those sub-districts that haven’t reached their target are asked by the director to respond to the results. Managers are requested to explain reasons for poor performance and what their improvement plans involve.

Some managers have become apprehensive towards attending the meeting, due to the sense of being 'punished'. One manager mentioned that in the past people were 'scared' of attending the meeting, apparently for fear of being embarrassed in front of their peers, especially when asked to 'account' for why targets weren't met. She told a story of one meeting where she had to explain her district's poor progress towards meeting targets in the previous quarter and how embarrassing it was to be identified as a poor performer in front of her peers. On her way home after the meeting she burst out in tears and had to stop her car next to the road to contain herself.

From the perspective of the District Senior Family Physician (see organogram in Figure 1), the problem was that focussing only on measuring targets meant that the focus on delivering good quality individual patient care was sometimes lost. The Family Physician's role is to ensure that the policies and protocols that the department implements, improves patient care. She needs to ensure that the care between the doctor, nurse and the patient is of good quality. Throughout the interview she kept referring back to the importance of the "patient behind the numbers". Knowing whether a target has been reached is not enough for her. In order to fulfil her own functions she needed to have information that informs her of both the type of service and the quality of services that a client received, for her to be able to identify system failures in need of improvement. She wants to see managers using health information more to make decisions about individual patient care, such as drawing up individual patient care plans. In the example below, she explained why she found the focus on measuring targets to be too narrow. The district had set the target for reducing mother to child transmission of HIV (PMTCT) at below 2%. For this reporting period the district achieved its target by only having a PMTCT transmission rate of 1.7%, implying that

1.7% of babies born to HIV positive mothers in the district became infected with HIV. The M&E meeting applauded the success. Nevertheless, she was concerned that managers were apparently content with just reaching the target and did not examine the reasons for why babies were still being infected (even if it was at a low rate). In her mind the 1.7 % infections represented 4 babies and this was 4 failures of the health services that the district could have learned from, had they moved beyond merely measuring and reaching targets. So in a recent discussion she had with the district PMTCT coordinator at a meeting where he presented data on PMTCT, she reminded him of the need to move beyond aggregated data for target measurement, to the level of clinical practice:

“Now that is four children. They have names, go and find their names, go and find their clinic, go to the PMTCT sub-districts, go and find out who are those babies”

District Senior Family Physician

There appears to be two interlinked issues underlying the frustrations of these managers regarding the use of routine information for measuring targets. The first issue is that clinical and district level managers are reliant on the information management directorate to feed them the data they need and for information support, but they do not necessarily have direct line function responsibility over the staff in the information management directorate. This may be creating tension between what managers expect and what information management produces. As discussed in the earlier section on data fulfilling management's needs, the information management and support function falls within its own sub-directorate, with reporting lines directly to the district director. (see organogram Figure 1) When discussing their challenges with accessing the information they need, the managers created the impression that they regarded the Information Directorate as a fairly

autonomous department. This was sometimes problematic, resulting in a clash of needs with managers from other sectors of district health.

One of the issues raised here, is the way information feedback is used apparently to improve management performance, but ironically with the effect of making management feel unsupported. One underlying issue may be that indicators and targets are not set at district level and there may be less of a sense of ownership of these targets. Targets are set at provincial and national levels and are then filtered down to each lower level with limited input by lower level managers. District performance is measured by the provincial and national departments of health in the form of progress towards targets on the indicators that are set at a national level as part of the NIDS and PIDS. (see context section for a description of how targets are set). The information management sub-directorate is tasked with providing the information to allow the district to report against these targets. The concern of the health information directorate is therefore to measure and provide the higher levels with data and reports that represent the district performance. This may be creating tension in the district between the need to produce information to report upwards on performance and the need for informational support for management decision-making.

Lippeveld (2000) suggests that one of the reasons why health information systems fail to provide managers with the information they need is that routine health information management systems (including the indicators that are measured) are mostly designed and structured at a centralized higher level. They are centrally planned and managed with indicators, data collection tools and reporting forms designed by epidemiologists, statisticians and administrators (which he terms “data people”) without the involvement of lower level managers, clinicians and other health care workers (which he terms “action

people”). He concludes by recommending that decentralizing the information management toward the district level through a participatory and consensus-building process may be an effective strategy (policy) to improve the use of routine information. (Lippeveld, 2000)

Data quality versus data use

“The emphasis is always on validity of data. And people always say: ‘No we can’t use this data cause it’s not correct. No we can’t discuss this data cause it’s not accurate.’ All the emphasis is on accuracy.” District Senior Family Physician

There is a perception amongst clinical and operational managers, that there is an overemphasis on data quality, and that this may be driven by the information management staff. In their view, there appears to be a tension between the needs of the health information management or ‘data people’ and the clinical and operational managers, the latter being described by Lippeveld (2000) as the ‘action’ people. It was felt that this has had the effect of managers and especially programme coordinators, spending a large amount of time on ensuring data quality in order to please the ‘data people’ (the managers in the information management directorate). The sense was that the disproportionate time they spent on data management resulted in a neglect of their clinical duties, especially for clinical programme coordinator.

An added effect as is described by the District family physician above is that managers tend to focus on issues regarding accuracy of data and therefore never reach the next stage where they use the available data for monitoring and decision-making. There appears to be a cycle of stagnation whenever data is discussed at different forums; where the focus shifts

from using the information to improve practice, to discussions about data quality issues. This often leads to decision making for 'action' being postponed due to mistrust of the data.

From the perspective of the Information management sub-directorate, the production of good quality data is central to their mission. They are tasked with ensuring that each service rendered in every facility was recorded correctly, collated into a report that is representative of all tasks completed and validated as representing a true reflection of operational activities. Data quality is the most important part of their job; it is what their performance is measured on, and what they feel accountable for. There are also strict processes for managing accountability in the information directorate, including external auditing. External quality assurance is not only a requirement, but a source of pride, especially when receiving a clean audit:

"The auditor checks everything. I have been audited frequently this year. I was audited by two auditors this year. And I didn't receive one COMEF [An audit qualification/error]. And I am very proud of that. I have a team that works hard, it's not me alone. If the team didn't keep everything in order I would not have made it."

Assistant Director: information Management

While the Assistant Director for Information management explained the auditing process, she took files from her book case to illustrate how indicators can be traced back to the original, raw data source. She takes pride in her job, spending time on ensuring that the data is correct and verifiable by visiting sub-districts and facilities in order to verify their registers against client folders and reports submitted. She described how she uses such opportunities to advocate for the importance of good data quality.

The information management team meets regularly with sub-district managers and programme coordinators to discuss data quality issues and audit results. Her sense is that she requires more resources than the modest team of data capturers and information officers she currently has. For example, for the specialised programmes such as the HAST program she feels there is a need for technical experts such as HAST coordinators, who will verify and validate the data; experts who will understand the programs and therefore understand the indicators.

As mentioned earlier, the strong focus on data quality in this district, creates a tension for programme managers, HAST co-ordinators and other managers who have the dual role of clinical management and collation of data for information management. Some felt they spent more time on improving data management than on clinical management.

The sub-district HAST coordinators have jobs with the dual functions of clinical co-ordination and data management and their experience illustrate the tension between these tasks. They play an important role in ensuring the success of the HAST programme and are expected to take responsibility for the governance of the HAST programme. They are viewed as the clinical experts of HAST and use their expertise to support facilities with the clinical management of the program while ensuring that the data collected is accurate. Duties include training staff members on new protocols, coordinating projects, ensuring the collecting and verification of data as well as identifying trends in burden of disease and treatment outcomes. A sub-district HAST coordinator explained how the tension between complying with technical information management standards for producing good quality data, sometimes detracts focus from improving quality of service delivery.

“I don’t have time to analyse data, I’m too busy validating, complying and collecting data. At the moment I make sure that five plus five is ten. I cross the T’s and I dot the I’s and I make sure to meet compliance. For example, in the past our family physician will ask me if I saw that there is a 30% HIV positivity rate at one of our facilities at antenatal. Then I will say ‘No’, but I made sure my HCT [HIV Counselling and Testing] program data is complete and correct. Then I wonder by myself, why I did not see it [referring to the high % of HIV positive patients recorded in once facility]. But my data is validated and verified and collated and it is correct and consistent and according to the CMI of information management. Then I feel that I have failed the programme” Sub-district HAST coordinator

It would seem that the data management workload has increased over the years. When this sub-district HAST coordinator started seven years ago, about twenty percent of his responsibilities were related to data management. He indicated that today, this takes up about fifty percent of his time. His clinical workload has also expanded beyond HIV/TB to include coordinating other programmes such as medical male circumcision (MMC), antiretroviral treatment (ART), drug resistant TB (DRTB) and the prevention of mother to child transmission (PMTCT). As shown in the earlier quote, this HAST coordinator is conflicted about getting the data quality perfect, as he feels this may come at the expense of using the data to improve services.

Events at the district bi-monthly HAST meeting, provide another illustration of the tension between ‘data’ tasks and ‘action’ tasks, even in the absence of the ‘data people’ (from information management directorate). A district programme coordinator presented data describing the current district profile of a dreaded infectious disease. The purpose of the

meeting was to review the running of the HAST program. Attendees included the HAST manager, sub-district HAST coordinators, PMTCT coordinators, MDR TB coordinator and district family physician. Standing agenda points for each disease within the HAST program are discussed. Discussions focus on events, challenges, new protocols and plans for the program. The meeting is chaired by the HAST manager. When reporting on the district disease profile, she spoke loudly and in a strict tone, almost commanding the audience to take the data seriously. Her message is clear: the 'numbers' did not look good. The number of infected patients has increased and the treatment outcomes have worsened. Near the end of her presentation she is interrupted by an audience member who asks a question regarding the accuracy of a certain indicator. Suddenly the discussion in the room is alive. Where before, the audience was listening quietly to her stern voice describing the dire situation, everyone now had an opinion. The discussion focused on how the indicators (data) do not present the full picture, and what the possible measurement challenges problems could be. Poor data quality, poor stationery completion, electronic registers that do not match the paper ones and unsuitable indicators were blamed for the poor picture that she had portrayed. In response to the lively discussion, the chair responded, by acknowledging the need to get clarity on the quality of the data:

"We will talk about it at the clinical meeting. We are working on having a special meeting [for this particular disease programme], but need to be able to trust the data first. So before we haven't made sense of the data we can't"

The result of this interaction focussed on checking data quality, was that the goal of her presentation, to identify areas for improvement of service delivery, was not achieved. The chair person wanted the managers to realise that things are not going well and that

improvement is needed, but the meeting ended up focussing only on the need for data quality to be verified, and postponed any decision-making about service improvement.

This section has illustrated the various ways in which role players engage in discussion of data, leading them to neglect their clinical duties and the clinical management of the program in support of a focus on data quality.

Data from observations as well as the views of managers as described above is suggesting that currently there may be an imbalance with the needs of the 'data people' overshadowing the needs of the 'action people'. People in the system have become used to questioning data quality. Data quality issues are quickly shown up by peers and information management alike in meetings and discussions, and a clean validation report and audit is applauded by information management and is highly valued, which are all potential benefits for strengthening use of information for decision-making. However, effective use of data for decision-making requires more than vigilance about data quality and production of good quality data. Sauerborn (2000) warns that ignoring the cultural difference between these two groups may lead to poor adaptation of the HIS to the needs of the action people and to poor communication of information from the data people to the action people. (Sauerborn, 2000) Whilst organisational processes are required to promote trust in the quality of the data, the and this in turn can promote the use of data by managers, but the challenge is how to balance the organisation effort and culture towards information support and data use for decision-making and action for quality improvement. (Lippeveld, 2000).

DISCUSSION

We set out to explore the data use practises of health managers at sub-district and district levels as well as the factors that shape their ‘culture’ of data use, as this is a gap in knowledge about strengthening health information systems. The findings were generated through developing an understanding of the context of the health information system, studying the processes and interactions of managers in relation to data use. Our study is exploratory in intent and identified a range of dynamics that influence the use of data for decision-making, and enhancing understanding of the complex interactions between the two key outcomes of strong health information systems: the production of good quality data and the use of that data for decision making and service quality improvements.

The study of the context of data use and of interactions with data in meetings show firstly that there is a strong focus on reporting requirements and technical aspects of producing good quality data. The district prides itself in having technical and managerial capacity as well as systematic processes for the collection, collation, validation, analysis and reporting of health information and have achieved well, as evidenced by external quality assurance measures (unqualified audits).

The PRISM framework defines RHIS performance as both “data quality and continuous use of information” and highlights how technical, behavioural, and organisational factors influence the processes that affect RHIS performance. We found that in this district, the strong drive to achieve excellence in production of quality data, may have had unintended

effects that limit the ease with which managers are able to use data continuously. A dominant aspect of this district's organisational culture, is striving for good quality data and what emerged is that this may be in tension with another important organisational value, which is the need of managers, for ease of access to relevant data, to facilitate decision-making and improvement of health service delivery.

The culture of data use seems to be well entrenched in this district. Managers interviewed clearly appreciated the value of good quality health information and they were an integral part of efforts to improve data quality, in terms of behavioural elements amongst management evidence witnessed in this study. They were motivated to use information for decision-making, created a demand for the information and seemed skilled at using the information for decision-making, behavioural factors that are recognised in the literature, as central to effective use of health information. (Aqil, et al., 2009; Lippeveld, 2000; Sauerborn, 2000)

However, as illustrated earlier, managers experienced a range of frustrations in relation to use of health information. Their overall experience was of not receiving the health information support they require. This is both in logistical terms; no being able to access relevant data in the required format and time-frames to enable effective decision-making. It was also in terms of not feeling supported in their efforts to improve services. Instead, they experienced an organisational culture of using health information to narrowly measure targets and performance. The way this monitoring of targets was done, often in meeting forums, and demanding managers account for poor performance, sometimes left managers feeling unsupported, frustrated and demotivated. Nevertheless, managers appear to be

fairly resilient in their responses, with some finding alternative ways to access their data they needed, relying on clinical and information staff more directly under their supervision.

Many studies have focussed on the importance of good quality data for a functioning health information system. Our results suggest that even in a setting where there are strong technical health information systems in place, the effective use of that health information is not guaranteed. Rather, the study highlighted a tension in the organisational culture of this district between the need to produce good quality data and the need to use data for continuous use. The experience of frontline managers interviewed, indicated that at times, there was an imbalance towards data quality that undermined the need to take 'action' for quality improvement. This was especially so when clinical managers and co-ordinators spent too much time on data collection, and when they used data quality checking as a reason to defer decision-making and action. We conclude that in our setting where the technical component of producing good data was performed, that this was not sufficient by itself, to guarantee effective use of the data and quality improvements, a dynamic well-recognised in the literature (Aqil, et al., 2009; Sauerborn, 2000; Lippeveld, 2000). The data use culture of the organisation was strongly influenced by the behavioural and organisational elements that influenced perceptions accessibility of data, motivation for using the data and organisational support and responsiveness.

LIMITATIONS

The case study was based on one district, focussing on one sub-district within. This allowed for in-depth study of information management processes and dynamics. Conducting the study in more sub-districts and interviewing more managers may have added different perspectives. However, given that much of the data management processes described apply

at a district-level (and that some meetings observed involved all sub-districts), it is likely that there may be similar responses in other sub-districts. The use of observational and interview data allowed for triangulation of data sources, which increases the credibility of the findings. The researcher's support role in health information strengthening may have influenced the interpretation of the findings, but this was minimised by ongoing reflection on this issue with co-investigators. The findings are aimed at providing new insights into complex organisational dynamics and may be generalizable to similar settings in the Western Cape and elsewhere in the country.

CONCLUSION

Our study adds to the gap in knowledge of the culture of data use by presenting the experience of health managers at the district and sub-district management levels. Our findings suggest that a cultural gap between those who collect, collate, analyse and report information and those who use information for decision-making. Careful attention should be paid to balancing the need for good quality data and the need for continuous use of data for decision-making and action. Future studies are required to further illuminate the culture of data use in different settings, in order to inform design of interventions to strengthen the functioning of health information systems and improve its impact on health outcomes.

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PART D: APPENDIX 1: QUESTIONNAIRE/DATA CAPTURE INSTRUMENT(S)

KEY INFORMANT INTERVIEW QUESTIONNAIRE

The interview questions were informed by field notes gathered during the participant observations. Interview questions were not set in stone and were mainly focused on answering the following broad questions:

- 1) What are the requirements for HAST data to be useful to managers?
- 2) What are the key drivers that affect data use practices?

Example questions for clinical and programme managers:

Can you explain what your role in the district is? What are you responsible for?

How much of your job has to do with information/data? What role does data play in your job?

Do you ever receive data feedback? How do you get it? Do you like the way it is presented?

What do you do with it? What is the quality of it? Do you trust it?

In your opinion how useful is HAST data to you? What can make it more useful?

What do you feel affects the way you use data for your job? What hinders you? What encourages you? Why?

Do you use data to make decisions? How often? Where do you get the data? Is it easy to get?

What role do you think does/should info management play with regards to HAST services?

Are they currently doing this? Why not? What is stopping them?

Let's talk about meetings. What is your opinion regarding meetings and the way data is presented in meetings? How would you change it?

Let's talk about the M&E meeting in particular.

What is your feelings regarding the meeting? What are your feelings regarding the way data is presented in the meeting? Has the structure changed over time?

Why do you attend the M&E meeting?

Have you got anything more to add?

Example questions for information managers:

Can you explain what your role in the district is? What are you responsible for? How long have you been in the “system”?

What role do you think does info management play in the district?

How has things changed in the past few years? How has the systems changed? Electronic vs paper?

How have these changes affected the system?

How much say do you at district have in what indicators are measured, what reports are generated?

How much say do you have with regards to who gets to see the data (data feedback)?

How has this changed over time?

How does the data flow in the district?

Who decides what reports go to who?

How does a manager get access to data?

In what way is data used in the district? By whom?

Let's talk about HAST data

What is your role currently with regards to HAST data?

Does HAST data follow the same flow and sign off as other data?

There is this common idea in the DOH that there is HAST (program) data on the one side and other data on the other side. What are your thoughts on this?

What role do you think does/should info management play with regards to HAST services?

Are they currently doing this? Why not? What are the challenges?

In your opinion how useful is HAST data to managers? What can make it more useful?

Let's talk about meetings. What is your opinion regarding meetings and the way data is presented in meetings? How would you change it?

Let's talk about the M&E meeting in particular.

What are your feelings regarding the meeting? What is the goal of the meeting?

What are your feelings regarding the way data is presented in the meeting? Has the structure changed over time?

Why do you attend the M&E meeting?

Have you got anything more to add?

DATA COLLECTION SHEET FOR PARTICIPANT OBSERVATIONS AND DOCUMENT REVIEWS

This data collection sheet was used to guide the documentation of the participant observations as well collecting data as part of the document reviews. It served as a framework to identify questions/issues discussed/raised during the meetings in both the participant observations and retrospectively from minutes and agendas from previous meetings as part of the document reviews.

Title of meeting: _____ Meeting date and time: _____

Attended by: _____

Purpose of the meeting:

When/at what points during the course of the meeting does HAST data get brought into the discussion? By whom?

What is the expressed purpose of the introduction of the HAST information? (e.g. for information or use background only, to share the most recent/updated data, in order to interrogate for accuracy, to use for target setting, to measure/review performance, to use for planning, to identify problem areas, to use for prioritising, use for staff allocations)

How does the meeting engage with the HAST information? (e.g. for information or background use only, to share the most recent/updated data, in order to interrogate for accuracy, to use for target setting, to measure/review performance, to use for planning, to identify problem areas, to use for prioritising, use for staff allocations) Who are the main participants in the discussions?

Are any issues with regards to availability, accuracy/completeness or appropriateness of the data (or data collection systems) raised during these discussions? Who raises them? What are these issues based on? What is the outcome (what actions/decisions are taken) of these raised issues?

What is the outcome (what actions/decisions are taken) of the discussion of HAST information? (e.g. none, decisions made, plans made, further investigations requested, follow up meetings requested, priorities set, problem areas identified and acted on)

What other health information is introduced and how does this relate to the HAST information? Why was this data discussed?

Other notes/observations and important quotes/statements:

PARTICIPANT OBSERVATION DATA SUMMARY TOOL

Data brought into discussion. When?			
By whom?			
Purpose of data introduction? Why?			
How does meeting engage with the info?			
Who are the main participants in discussions			
Any issues raised with data?			
By whom?			
Outcome of discussion? Actions taken?			

Other health info introduced? Why?			
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Notes:

APPENDIX 2: CONSENT FORM AND PARTICIPANT INFORMATION FORM

INFORMATION SHEET AND CONSENT FORM FOR PARTICIPANT OBSERVATION OF MEETINGS

Consent to participate in research study: The culture of data use in the management structures of a rural health district in the western cape province

We request you to participate in a research study conducted by Theunis Hurter, contributing to the researchers' Master in Public Health thesis at the University Of Cape Town School Of Public Health. Please take some time to read through the information provided below and make sure you understand exactly what the study is about and what we ask of you. You have been selected to be part of this study as you are a manager working with HAST services in the District. Please ask any questions you may have in order to better understand the study and your role as a participant.

1. Purpose of the study

The aim of the study is to explore the culture of data use in the management structures of the district by investigating how data is used for management in HAST services and the factors that shape the use.

2. Procedures

You may participate in this study as a manager involved with HAST service delivery.

To fully understand the "culture" of data use for management the researcher aims to attend management meetings at all levels of management. The researcher will sit in (observe) this

management meeting and take notes with regards to his observations of the discussions taking place. Observations will focus on investigating when data is brought into the discussion, why data is discussed and in what way data is discussed as well as how it is used for decision making. The observations will inform understanding of the patterns of information use and help identify factors that influence these patterns.

3. Potential risks or discomforts from taking part in the study

You may find that the information discussed in the meetings is private and confidential. You may feel concerned that the researcher may disclose information regarding your work and possibly the work of your managers that could get you into trouble or have an impact on your performance review or staff relations.

The results of this study will be presented without mention of any personal information. No results will be able to be linked back to a specific person.

There will be no negative or positive consequences of participating or not participating in the study with regards to your work, in relation to your employer.

The researcher is conducting this research for the purpose of an academic study contributing to the researchers' Master in Public Health thesis and not as part of his job as technical advisor to the department of health. The study methods, results and discussion will be compiled into a journal article, a shorter summary as well as a PowerPoint presentation in order to achieve maximum benefit from the research. You will also receive a copy by hand or e-mail before submission to a journal. If you do not agree with any part of the analysis you must please inform the principal researcher or supervisor. (Contact details below)

4. Potential benefits to you or the society at large

There are no direct benefits to you from taking part in this study. No reimbursement will be given for your participation. There will be no negative or positive consequences of participating or not participating in the study with regards to your work, in relation to your employer. We are hoping that the findings in this study may influence future data use policies as well as trainings in order to identify useful indicators and reports for management. We hope that this study can start the discussion and inform future research regarding managers need for routine data and how they use this data in order to improve the health system.

5. Confidentiality

Confidentiality will be maintained by means of codes. Each questionnaire and recording will be given a unique code that will be linked to each participant on a sheet that only the principle researchers will have access to. All identifying information will be removed from the records and all original copies will be stored in a lockable drawer that only the research team will be able to access.

6. Participation

Your participation in this study is entirely voluntary. You have the right to refuse to participate or to suspend your participation at any time point during the study. There will be no negative or positive consequences of participating or not participating in the study with regards to your work, in relation to your employer. You may also refuse to have something you said or did during the meeting be included in the study data. If you decide not be part of

the study, no field notes will be taken on your statements and all data that includes you will be excluded from the study.

7. Investigators

If you have any questions or concerns regarding the research you are welcome to contact the principal researcher or student supervisor at any time point before or during the study at:

Principal Investigator:

Mr Theunis Hurter

36 Broeksma Crescent

Strand

7140

Telephone number: 0769919276

E-mail: theunishurter@gmail.com

Student Supervisor:

Dr Chris Colvin

Head of the Division of Social and Behavioural Sciences

Senior Research Officer

Centre for Infectious Disease Epidemiology and Research (CIDER)

School of Public Health and Family Medicine

University of Cape Town

Falmouth Building, Room 3.46

Office telephone number: [+27-21-406-6706](tel:+27-21-406-6706)

E-mail: cj.colvin@uct.ac.za

7. Ethics committee

The committee giving ethical approval for this study is the Faculty of Health Sciences Human Research Ethics Committee, University of Cape Town. If you have any problems or questions about this study please contact the Ethics committee directly, at telephone number: 021 406 6338

8. Participant declaration

I declare that I have read the information above and understand the information regarding the study and my role in the study. I give my voluntary consent to participate in the study. I understand that I may withdraw at any time point during the study without any consequences.

Name of participant:_____

Signature:_____

Date:_____

Signature of investigator:_____

INFORMATION SHEET AND CONSENT FORM FOR INTERVIEWS

Consent to participate in research study: The culture of data use in the management structures of a rural health district in the western cape province

We request you to participate in a research study conducted by Theunis Hurter, contributing to the researchers' Master in Public Health thesis at the University Of Cape Town School Of Public Health. Please take some time to read through the information provided below and make sure you understand exactly what the study is about and what we ask of you. You have been selected to be part of this study as you are a manager working with HAST services in the District. Please ask any questions you may have in order to better understand the study and your role as a participant.

1. Purpose of the study

The aim of the study is to explore the culture of data use in the management structures of the district by investigating how data is used for management in HAST services and the factors that shape the use.

2. Procedures

You may participate in this study as a manager involved with HAST service delivery.

As a participant you would be expected to do the following:

1. Participate in an interview where a trained interviewer will ask you questions regarding your data use practices and the impact of information on your daily work.

The interviews serve to deepen the knowledge gained from the participant observations.

2. The interviews will be digitally (audio) recorded in order to allow for better analysis.

You may opt to not have the interview session recorded. There will be no negative implications to you if you wish to opt out of having the session audio recorded. If you opt out of having the interviews audio recorded only written notes will be taken.

3. Potential risks or discomforts from taking part in the study

You may find that giving information regarding your job sensitive and uncomfortable. You may feel that disclosing information regarding your work and possibly the work of your managers could get you into trouble or have an impact on your performance review or staff relations. There will be no negative or positive consequences of participating or not participating in the study with regards to your work, in relation to your employer. The results of this study will be presented without mention of any personal information. No results will be able to be linked back to a specific person.

The study methods, results and discussion will be compiled into a journal article, a shorter summary as well as a PowerPoint presentation in order to achieve maximum benefit from the research. You will also receive a copy by hand or e-mail before submission to a journal. If you do not agree with any part of the analysis you must please inform the principal researcher. (Contact details below)

4. Potential benefits to you or the society at large

There are no direct benefits to you from taking part in this study. No reimbursement will be given for your participation. There will be no negative or positive consequences of participating or not participating in the study with regards to your work, in relation to your employer. We are hoping that the findings in this study may influence future data use policies as well as trainings in order to identify useful indicators and reports for management. We hope that this study can start the discussion and inform future research regarding managers need for routine data and how they use this data in order to improve the health system.

5. Confidentiality

Confidentiality will be maintained by means of codes. Each questionnaire and recording will be given a unique code that will be linked to each participant on a sheet that only the principle researchers will have access to. All identifying information will be removed from the records and all original copies will be stored in a lockable drawer that only the research team will be able to access.

6. Participation

Your participation in this study is entirely voluntary. You have the right to refuse to participate or to suspend your participation at any time point during the study. There will be no negative or positive consequences of participating or not participating in the study with regards to your work, in relation to your employer. You may also refuse to answer any question you feel uncomfortable with. This will not exclude you from the study.

7. Investigators

If you have any questions or concerns regarding the research you are welcome to contact the principal researcher or student supervisor at any time point before or during the study at:

Principal Investigator:

Mr Theunis Hurter

36 Broeksma Crescent

Strand

7140

Telephone number: 0769919276

E-mail: theunishurter@gmail.com

Student Supervisor:

Dr Chris Colvin

Head of the Division of Social and Behavioural Sciences

Senior Research Officer

Centre for Infectious Disease Epidemiology and Research (CIDER)

School of Public Health and Family Medicine

University of Cape Town

Falmouth Building, Room 3.46

Office telephone number: [+27-21-406-6706](tel:+27-21-406-6706)

E-mail: cj.colvin@uct.ac.za

7. Ethics committee

The committee giving ethical approval for this study is the Faculty of Health Sciences Human Research Ethics Committee, University of Cape Town. If you have any problems or questions

about this study please contact the Ethics committee directly, at telephone number: 021 406 6338

8. Participant declaration

I declare that I have read the information above and understand the information regarding the study and my role in the study. I understand that I may withdraw at any time point during the study without any consequences.

I give voluntary consent to participate in the study: Yes / No

I give voluntary consent for the interviews to be digital (audio) recorded: Yes / No

Name of participant:_____

Signature:_____

Date:_____

Signature of investigator:_____

APPENDIX 3: LETTER OF APPROVAL FROM RESEARCH ETHICS COMMITTEE

APPENDIX 4: INSTRUCTIONS FOR AUTHOR OF JOURNAL WHOSE FORMAT HAS BEEN USED

INSTRUCTIONS FOR AUTHORS: BMC HEALTH SERVICES RESEARCH

Research articles

Criteria

Research articles should report on original primary research, but may report on systematic reviews of published research provided they adhere to the appropriate reporting guidelines which are detailed in our Editorial Policies. Please note that non-commissioned pooled analyses of selected published research will not be considered.

Submission process

Manuscripts must be submitted by one of the authors of the manuscript, and should not be submitted by anyone on their behalf. The submitting author takes responsibility for the article during submission and peer review.

Please note that *BMC Health Services Research* levies an article-processing charge on all accepted Research articles; if the submitting author's institution is a BioMed Central member the cost of the article-processing charge may be covered by the membership (see About page for detail). Please note that the membership is only automatically recognised on submission if the submitting author is based at the member institution.

To facilitate rapid publication and to minimize administrative costs, *BMC Health Services Research* prefers online submission.

Files can be submitted as a batch, or one by one. The submission process can be interrupted at any time; when users return to the site, they can carry on where they left off.

See below for examples of word processor and graphics file formats that can be accepted for the main manuscript document by the online submission system. Additional files of any type, such as movies, animations, or original data files, can also be submitted as part of the manuscript.

During submission you will be asked to provide a cover letter. Use this to explain why your manuscript should be published in the journal, to elaborate on any issues relating to our editorial policies in the 'About *BMC Health Services Research*' page, and to declare any potential competing interests. You will be also asked to provide the contact details (including email addresses) of potential peer reviewers for your manuscript. These should be experts in their field, who will be able to provide an objective assessment of the manuscript. Any suggested peer reviewers should not have published with any of the authors of the manuscript within the past five years, should not be current collaborators, and should not be members of the same research institution. Suggested reviewers will be considered alongside potential reviewers recommended by the Editorial team, Editorial Advisors, Section Editors and Associate Editors.

Assistance with the process of manuscript preparation and submission is available from BioMed Central customer support team.

We also provide a collection of links to useful tools and resources for scientific authors on our Useful Tools page.

File formats

The following word processor file formats are acceptable for the main manuscript document:

- Microsoft word (DOC, DOCX)
- Rich text format (RTF)
- Portable document format (PDF)
- TeX/LaTeX (use BioMed Central's TeX template)
- DeVice Independent format (DVI)

TeX/LaTeX users: Please use BioMed Central's TeX template and BibTeX stylefile if you use TeX format. During the TeX submission process, please submit your TeX file as the main manuscript file and your bib/bbl file as a dependent file. Please also convert your TeX file into a PDF and submit this PDF as an additional file with the name 'Reference PDF'. This PDF will be used by internal staff as a reference point to check the layout of the article as the author intended. Please also note that all figures must be coded at the end of the TeX file and not inline.

If you have used another template for your manuscript, or if you do not wish to use BibTeX, then please submit your manuscript as a DVI file. We do not recommend converting to RTF. For all TeX submissions, all relevant editable source must be submitted during the submission process. Failing to submit these source files will cause unnecessary delays in the publication procedures.

Publishing Datasets

Through a special arrangement with LabArchives, LLC, authors submitting manuscripts to BMC Health Services Research can obtain a complimentary subscription to LabArchives with

an allotment of 100MB of storage. LabArchives is an Electronic Laboratory Notebook which will enable scientists to share and publish data files in situ; you can then link your paper to these data. Data files linked to published articles are assigned digital object identifiers (DOIs) and will remain available in perpetuity. Use of LabArchives or similar data publishing services does not replace preexisting data deposition requirements, such as for nucleic acid sequences, protein sequences and atomic coordinates.

Instructions on assigning DOIs to datasets, so they can be permanently linked to publications, can be found on the LabArchives website. Use of LabArchives' software has no influence on the editorial decision to accept or reject a manuscript.

Authors linking datasets to their publications should include an Availability of supporting data section in their manuscript and cite the dataset in their reference list.

Preparing main manuscript text

General guidelines of the journal's style and language are given below.

Overview of manuscript sections for Research articles

Manuscripts for Research articles submitted to *BMC Health Services Research* should be divided into the following sections (in this order):

- Title page
- Abstract
- Keywords
- Background
- Methods
- Results and discussion

- Conclusions
- List of abbreviations used (if any)
- Competing interests
- Authors' contributions
- Authors' information
- Acknowledgements
- Endnotes
- References
- Illustrations and figures (if any)
- Tables and captions
- Preparing additional files

The **Accession Numbers** of any nucleic acid sequences, protein sequences or atomic coordinates cited in the manuscript should be provided, in square brackets and include the corresponding database name; for example, [EMBL:AB026295, EMBL:AC137000, DDBJ:AE000812, GenBank:U49845, PDB:1BFM, Swiss-Prot:Q96KQ7, PIR:S66116].

The databases for which we can provide direct links are: EMBL Nucleotide Sequence Database (EMBL), DNA Data Bank of Japan (DDBJ), GenBank at the NCBI (GenBank), Protein Data Bank (PDB), Protein Information Resource (PIR) and the Swiss-Prot Protein Database (Swiss-Prot).

You can download a template (Mac and Windows compatible; Microsoft Word 98/2000) for your article.

For reporting standards please see the information in the About section.

The title page should:

- provide the title of the article
- list the full names, institutional addresses and email addresses for all authors
- indicate the corresponding author

Please note:

- the title should include the study design, for example "A versus B in the treatment of C: a randomized controlled trial X is a risk factor for Y: a case control study"
- abbreviations within the title should be avoided

Abstract

The Abstract of the manuscript should not exceed 350 words and must be structured into separate sections: **Background**, the context and purpose of the study; **Methods**, how the study was performed and statistical tests used; **Results**, the main findings; **Conclusions**, brief summary and potential implications. Please minimize the use of abbreviations and do not cite references in the abstract. **Trial registration**, if your research article reports the results of a controlled health care intervention, please list your trial registry, along with the unique identifying number (e.g. **Trial registration:** Current Controlled Trials ISRCTN73824458). Please note that there should be no space between the letters and numbers of your trial registration number. We recommend manuscripts that report randomized controlled trials follow the CONSORT extension for abstracts.

Keywords

Three to ten keywords representing the main content of the article.

Background

The Background section should be written in a way that is accessible to researchers without specialist knowledge in that area and must clearly state - and, if helpful, illustrate - the background to the research and its aims. Reports of clinical research should, where appropriate, include a summary of a search of the literature to indicate why this study was necessary and what it aimed to contribute to the field. The section should end with a brief statement of what is being reported in the article.

Methods

The methods section should include the design of the study, the setting, the type of participants or materials involved, a clear description of all interventions and comparisons, and the type of analysis used, including a power calculation if appropriate. Generic drug names should generally be used. When proprietary brands are used in research, include the brand names in parentheses in the Methods section.

For studies involving human participants a statement detailing ethical approval and consent should be included in the methods section. For further details of the journal's editorial policies and ethical guidelines see 'About this journal'.

For further details of the journal's data-release policy, see the policy section in 'About this journal'.

Results and discussion

The Results and discussion may be combined into a single section or presented separately. Results of statistical analysis should include, where appropriate, relative and absolute risks or risk reductions, and confidence intervals. The Results and discussion sections may also be broken into subsections with short, informative headings.

Conclusions

This should state clearly the main conclusions of the research and give a clear explanation of their importance and relevance. Summary illustrations may be included.

List of abbreviations

If abbreviations are used in the text they should be defined in the text at first use, and a list of abbreviations can be provided, which should precede the competing interests and authors' contributions.

Competing interests

A competing interest exists when your interpretation of data or presentation of information may be influenced by your personal or financial relationship with other people or organisations. Authors must disclose any financial competing interests; they should also reveal any non-financial competing interests that may cause them embarrassment were they to become public after the publication of the manuscript.

Authors are required to complete a declaration of competing interests. All competing interests that are declared will be listed at the end of published articles. Where an author gives no competing interests, the listing will read 'The author(s) declare that they have no competing interests'.

When completing your declaration, please consider the following questions:

Financial competing interests

- In the past three years have you received reimbursements, fees, funding, or salary from an organization that may in any way gain or lose financially from the

publication of this manuscript, either now or in the future? Is such an organization financing this manuscript (including the article-processing charge)? If so, please specify.

- Do you hold any stocks or shares in an organization that may in any way gain or lose financially from the publication of this manuscript, either now or in the future? If so, please specify.
- Do you hold or are you currently applying for any patents relating to the content of the manuscript? Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript? If so, please specify.
- Do you have any other financial competing interests? If so, please specify.

Non-financial competing interests

Are there any non-financial competing interests (political, personal, religious, ideological, academic, intellectual, commercial or any other) to declare in relation to this manuscript? If so, please specify.

If you are unsure as to whether you, or one your co-authors, has a competing interest please discuss it with the editorial office.

Authors' contributions

In order to give appropriate credit to each author of a paper, the individual contributions of authors to the manuscript should be specified in this section.

According to ICMJE guidelines, An 'author' is generally considered to be someone who has made substantive intellectual contributions to a published study. To qualify as an author one should 1) have made substantial contributions to conception and design, or acquisition

of data, or analysis and interpretation of data; 2) have been involved in drafting the manuscript or revising it critically for important intellectual content; 3) have given final approval of the version to be published; and 4) agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Each author should have participated sufficiently in the work to take public responsibility for appropriate portions of the content. Acquisition of funding, collection of data, or general supervision of the research group, alone, does not justify authorship.

We suggest the following kind of format (please use initials to refer to each author's contribution): AB carried out the molecular genetic studies, participated in the sequence alignment and drafted the manuscript. JY carried out the immunoassays. MT participated in the sequence alignment. ES participated in the design of the study and performed the statistical analysis. FG conceived of the study, and participated in its design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

All contributors who do not meet the criteria for authorship should be listed in an acknowledgements section. Examples of those who might be acknowledged include a person who provided purely technical help, writing assistance, or a department chair who provided only general support.

Endnotes

Endnotes should be designated within the text using a superscript lowercase letter and all notes (along with their corresponding letter) should be included in the Endnotes section. Please format this section in a paragraph rather than a list.

References

All references, including URLs, must be numbered consecutively, in square brackets, in the order in which they are cited in the text, followed by any in tables or legends. Each reference must have an individual reference number. Please avoid excessive referencing. If automatic numbering systems are used, the reference numbers must be finalized and the bibliography must be fully formatted before submission.

Only articles, clinical trial registration records and abstracts that have been published or are in press, or are available through public e-print/preprint servers, may be cited; unpublished abstracts, unpublished data and personal communications should not be included in the reference list, but may be included in the text and referred to as "unpublished observations" or "personal communications" giving the names of the involved researchers. Obtaining permission to quote personal communications and unpublished data from the cited colleagues is the responsibility of the author. Footnotes are not allowed, but endnotes are permitted. Journal abbreviations follow Index Medicus/MEDLINE. Citations in the reference list should include all named authors, up to the first six before adding 'et al.'..

Any *in press* articles cited within the references and necessary for the reviewers' assessment of the manuscript should be made available if requested by the editorial office.

An Endnote style file is available.

Examples of the *BMC Health Services Research* reference style are shown below. Please ensure that the reference style is followed precisely; if the references are not in the correct style they may have to be retyped and carefully proofread.

All web links and URLs, including links to the authors' own websites, should be given a reference number and included in the reference list rather than within the text of the

manuscript. They should be provided in full, including both the title of the site and the URL, in the following format: **The Mouse Tumor Biology Database** [<http://tumor.informatics.jax.org/mtbwi/index.do>]. If an author or group of authors can clearly be associated with a web link, such as for weblogs, then they should be included in the reference.

Examples of the *BMC Health Services Research* reference style

Article within a journal

Smith JJ. The world of science. *Am J Sci*. 1999;36:234-5.

Article within a journal (no page numbers)

Rohrmann S, Overvad K, Bueno-de-Mesquita HB, Jakobsen MU, Egeberg R, Tjønneland A, et al. Meat consumption and mortality - results from the European Prospective Investigation into Cancer and Nutrition. *BMC Medicine*. 2013;11:63.

Article within a journal by DOI

Slifka MK, Whitton JL. Clinical implications of dysregulated cytokine production. *Dig J Mol Med*. 2000; doi:10.1007/s801090000086.

Article within a journal supplement

Frumin AM, Nussbaum J, Esposito M. Functional asplenia: demonstration of splenic activity by bone marrow scan. *Blood* 1979;59 Suppl 1:26-32.

Book chapter, or an article within a book

Wyllie AH, Kerr JFR, Currie AR. Cell death: the significance of apoptosis. In: Bourne GH, Danielli JF, Jeon KW, editors. *International review of cytology*. London: Academic; 1980. p. 251-306.

OnlineFirst chapter in a series (without a volume designation but with a DOI)

Saito Y, Hyuga H. Rate equation approaches to amplification of enantiomeric excess and chiral symmetry breaking. *Top Curr Chem*. 2007. doi:10.1007/128_2006_108.

Complete book, authored

Blenkinsopp A, Paxton P. Symptoms in the pharmacy: a guide to the management of common illness. 3rd ed. Oxford: Blackwell Science; 1998.

Online document

Doe J. Title of subordinate document. In: The dictionary of substances and their effects. Royal Society of Chemistry. 1999. [http://www.rsc.org/dose/title of subordinate document](http://www.rsc.org/dose/title%20of%20subordinate%20document). Accessed 15 Jan 1999.

Online database

Healthwise Knowledgebase. US Pharmacopeia, Rockville. 1998. <http://www.healthwise.org>. Accessed 21 Sept 1998.

Supplementary material/private homepage

Doe J. Title of supplementary material. 2000. <http://www.privatehomepage.com>. Accessed 22 Feb 2000.

University site

Doe, J: Title of preprint. <http://www.uni-heidelberg.de/mydata.html> (1999). Accessed 25 Dec 1999.

FTP site

Doe, J: Trivial HTTP, RFC2169. <ftp://ftp.isi.edu/in-notes/rfc2169.txt> (1999). Accessed 12 Nov 1999.

Organization site

ISSN International Centre: The ISSN register. <http://www.issn.org> (2006). Accessed 20 Feb 2007.

Figure legends

The legends should be included in the main manuscript text file at the end of the document, rather than being a part of the figure file. For each figure, the following information should be provided: Figure number (in sequence, using Arabic numerals - i.e. Figure 1, 2, 3 etc); short title of figure (maximum 15 words); detailed legend, up to 300 words.

Please note that it is the responsibility of the author(s) to obtain permission from the copyright holder to reproduce figures or tables that have previously been published elsewhere.

Preparing tables

Each table should be numbered and cited in sequence using Arabic numerals (i.e. Table 1, 2, 3 etc.). Tables should also have a title (above the table) that summarizes the whole table; it should be no longer than 15 words. Detailed legends may then follow, but they should be concise. Tables should always be cited in text in consecutive numerical order.

Smaller tables considered to be integral to the manuscript can be pasted into the end of the document text file, in A4 portrait or landscape format. These will be typeset and displayed in the final published form of the article. Such tables should be formatted using the 'Table object' in a word processing program to ensure that columns of data are kept aligned when the file is sent electronically for review; this will not always be the case if columns are generated by simply using tabs to separate text. Columns and rows of data should be made

visibly distinct by ensuring that the borders of each cell display as black lines. Commas should not be used to indicate numerical values. Color and shading may not be used; parts of the table can be highlighted using symbols or bold text, the meaning of which should be explained in a table legend. Tables should not be embedded as figures or spreadsheet files. Larger datasets or tables too wide for a portrait page can be uploaded separately as additional files. Additional files will not be displayed in the final, laid-out PDF of the article, but a link will be provided to the files as supplied by the author.

Tabular data provided as additional files can be uploaded as an Excel spreadsheet (.xls) or comma separated values (.csv). As with all files, please use the standard file extensions.

Style and language

General

Currently, *BMC Health Services Research* can only accept manuscripts written in English.

Spelling should be US English or British English, but not a mixture.

There is no explicit limit on the length of articles submitted, but authors are encouraged to be concise.

BMC Health Services Research will not edit submitted manuscripts for style or language; reviewers may advise rejection of a manuscript if it is compromised by grammatical errors. Authors are advised to write clearly and simply, and to have their article checked by colleagues before submission. In-house copyediting will be minimal. Non-native speakers of English may choose to make use of a copyediting service.

Abbreviations

Abbreviations should be used as sparingly as possible. They should be defined when first used and a list of abbreviations can be provided following the main manuscript text.

Typography

- Please use double line spacing.
- Type the text unjustified, without hyphenating words at line breaks.
- Use hard returns only to end headings and paragraphs, not to rearrange lines.
- Capitalize only the first word, and proper nouns, in the title.
- All lines and pages should be numbered. Authors are asked to ensure that line numbering is included in the main text file of their manuscript at the time of submission to facilitate peer-review. Once a manuscript has been accepted, line numbering should be removed from the manuscript before publication. For authors submitting their manuscript in Microsoft Word please do not insert page breaks in your manuscript to ensure page numbering is consistent between your text file and the PDF generated from your submission and used in the review process.
- Use the *BMC Health Services Research* reference format.
- Footnotes are not allowed, but endnotes are permitted.
- Please do not format the text in multiple columns.
- Greek and other special characters may be included. If you are unable to reproduce a particular special character, please type out the name of the symbol in full. **Please ensure that all special characters used are embedded in the text, otherwise they will be lost during conversion to PDF.**

